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CIVIL ENGINEERING.

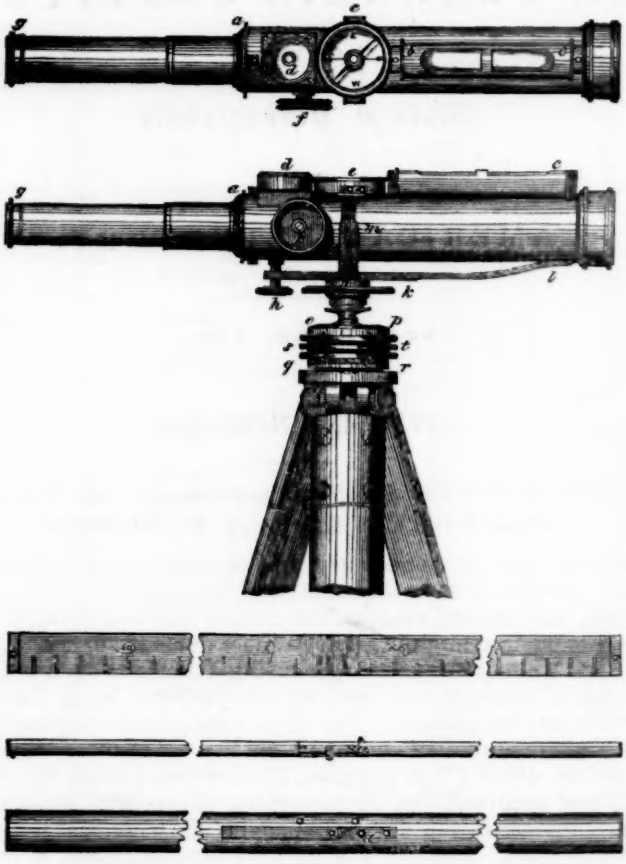
Description of Portable Leveling Instruments. *By* DAVID STEVENSON, F.R.S.E., F.R.S.S.A., C. E., Edinburgh.*

In examining a tract of country, I have often experienced the want of some portable, and, at the same time, accurate instrument, for ascertaining, in a general manner, the relative levels of different points, previous to determining the line of a more detailed survey. A small spirit-level without any telescope, having a common sight and cross-hair attached, is sometimes used for that purpose, being fixed on a staff stuck into the ground. The large instruments commonly used in leveling, are also often employed, but neither of these instruments answers the object I had in view; the first being much too rude for the required accuracy, and the second too heavy for easy transport. The level represented in the accompanying drawing, was designed to supply this want. It consists of an accurate spirit-level, a ten inch telescope, and a compass, so arranged as to admit of being very portable. The telescope unscrews at letter A, so as to form two compartments, and the whole is packed in a pocket case measuring 6 by 2¼ inches; and the tripod on which it stands does not exceed the bulk of a thick walking staff.

Referring to the drawing, B C is the level, D a circular level, E the compas, F screw for adjusting focus, G the eye piece, H screw acting

* Read before the Royal Scottish Society of Arts, 12th of February, 1844.

on spring K L, which is fixed to the telescope at M, by a crutch on which it moves, N the screw by which it is fixed to the tripod, O P Q R the top of the tripod, which contains a ball and socket joint, shown in dotted lines, which can be clamped and unclamped by means of a screw wrought on the inside of the part S T. In setting the instrument, the screw S T is first unclamped, and the instrument is moved by the hand on the ball and socket joint until the air bubble of the



level D, occupies the centre of the circular box containing it. The screw S T, is then clamped, and the instrument being directed to the object to be observed, the final and more perfect adjustment is made by bringing the air bubble B C, to occupy the centre of its tube, which is done by means of the screw H, which acts on the spring K L. The tripod is that used by Dolland for the camera lucida, and answers both instruments. The telescope can be made either, as in ordinary

levels, to reverse the objects, or, as in theodolites, to show them in their true positions. In this level, made for myself, I have adopted the latter construction, in order that the instrument may answer more perfectly the purposes of a field telescope. The addition of the compas is also a further convenience.

In connexion with this instrument, I have also had a portable leveling staff made, which also is shown in the engraving. It consists of an elliptically-moulded staff three feet three inches in length, and cut through the middle; the two halves are hinged at one extremity, and, when unfolded, are fixed by a spring at A, forming a rod six feet six inches long, on the flat side of which the graduations of feet and inches are painted; when closed, the graduation is protected from injury, and the whole forms a convenient walking staff.

These instruments, which were made for me by Messrs. Adie, of Edinburgh, I have found very convenient; and, I am persuaded, they will be suitable in all circumstances where the combination of *accuracy* and *portability* is required.

Edinburgh New Philos. Journ.

LIPSCOMBE'S *Patent Apparatus for lessening the vibration and noise of Railway Wheels.*

It is now generally understood that the rapid deterioration as regards the strength of railway wheels and axles, is chiefly caused by the intense vibration to which they are subjected. This can readily be made evident:—If the journal of an old railway axle is struck with a smith's hammer, it will, in many cases, break off with a single blow, presenting, at the fractured part, a weak, brittle appearance; whereas the journal of a new axle will take several hundred blows before breaking, a tough, fibrous appearance being presented at the fractured part. Suppose a finger to be in the act of creating a musical sound by laterally distending a harp string, it is plain, if the finger is taken away, the elasticity of the string will cause it to fly to and fro, until, from the friction of its fibres, the string is brought to a quiescent state. Now it is clear that the same effect would be produced by deflecting the harp string with a weight, and suddenly withdrawing that weight. We thus see, as the weight upon a wheel in motion is ever shifting, the particles composing a wheel are successively deflected every revolution, the weight shifting with a rapidity depending upon the speed of the wheel. It follows, as in the case of the harp string, that the deflected particles, immediately the weight is shifted, will begin and continue to vibrate until the wheel stops; the consequence is either the spokes become loose, thus rendering the wheel useless, or the particles of the wheel by being wedged and dove-tailed together, become, by this wriggling motion, so loosened and broken, as, in a few years, to render the wheel unsafe, consequently useless, from its great decrease of strength, although the actual quantity of metal in the wheel remains the same as ever.

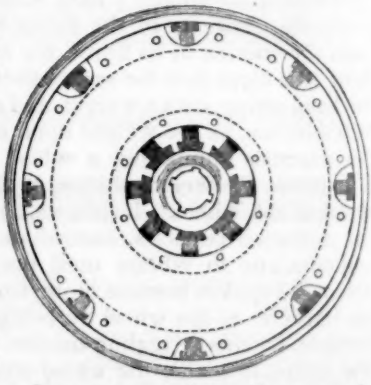
The same remarks are applicable to railway axles.

The vibration which takes place in a wheel is communicated to the axle, as the axle is struck by the vibratory particles of the wheel. That this is exceedingly destructive to wheels and axles, is sufficiently attested by their great decrease of strength, and the pecuniary loss every railway company sustains from this cause, together with the accidents which have occurred by the breakage of axles.

Mr. Lipscombe, after a variety of experiments, ascertained that any metallic body could be prevented from vibrating, by simply pressing a quantity of sawdust, &c., in contact with it, so that when the particles of a body are deflected by a weight, their elasticity, when the weight is withdrawn, is spent in forcing back the sawdust, while resuming their original position.

An apparatus was constructed and applied to the wheels of a ballast wagon by way of experiment, and exceeded the most sanguine expectations formed of it. It completely prevented vibration, not only in the wheels, but in the axles; the noise of the wheels was very slight, the little noise produced being occasioned by passing over loose, or sunken, joints, and the wheels, as may be supposed, from the absence of vibration, had a very easy motion.

The patentee subsequently, through the recommendation of Mr. R. Stephenson, obtained permission of the directors of the London and Birmingham Railway, to apply his apparatus to one of their first class carriages. Previous to the wheels being placed under the carriage, one pair, with the apparatus applied, was slung off the ground, and struck in various parts of the axle and wheels, but not the slightest vibration could be detected. Another pair not fitted with the apparatus was afterwards slung in a similar manner, and when struck, produced a sound as loud and prolonged as a bell would have done. The carriage has been running daily with the trains for upwards of nine weeks, and is a great favorite for its peculiarly smooth motion, and comparative noiselessness, although, from being in a train with carriages before and behind it, the ears are assailed by their noise.



The apparatus is very simple, consisting of a plate of zinc placed on each side of a wheel, for the purpose of retaining sawdust, in contact with part of the rim and spokes; each plate has two wooden rings of unequal size, permanently fixed to it, the external diameter of the smaller ring, and the internal diameter of the larger ring, are shown by dotted circles in the annexed figure, and are likewise flush with the edges of the zinc plates. The combined depth of the corresponding rings is equal in width to the tyre; these rings meet and are screwed together, certain parts of the rings being cut away to let in the spokes. By a reference to the figure, it will be seen that the ends of the spokes, adjoining the

nave and tyre, are left exposed for the purpose of noticing any defect which may take place in those parts.

The apparatus may be detached from the wheel, by simply taking out the screws which hold the corresponding rings together, and is applicable, with slight modifications, to all existing metal wheels. The cost of the apparatus is £1 per wheel, and it will last for many years.

Wheels formed of a combination of wood and iron are in partial use upon some railways, for the purpose of decreasing noise and vibration, which still exists, notwithstanding, to a very considerable extent. It must be recollected that all bodies are vibratory—the harder and more fibrous a body the more freely will it vibrate; therefore, it is utterly impossible to use any material tough enough to form part of a railway wheel but which will vibrate, and create considerable noise, unless a non-vibrating substance, such as sawdust, is placed in contact with it. The disadvantages and danger of railway wheels formed of a combination of wood and iron are well known to engineers, as far counterbalancing their slight decrease of vibration and noise.

There cannot be a doubt that an iron wheel prevented from vibrating, would be the safest, most durable, most economical, and the most noiseless, with a smoother motion, and less draught than any other description of wheel.

Lond. Mechanics' Mag.

The Atmospheric Railway.—Opinions of ROBERT STEVENSON, C. E., *based upon his Experiments at Dalkey.*

1st. That the atmospheric system is not an economical mode of transmitting power, and inferior in this respect both to locomotive engines and stationary engines with ropes.

2d. That it is not calculated practically to acquire and maintain higher velocities than are comprised in the present working of locomotive engines.

3d. That it would not, in the majority of instances, produce economy in the original construction of railways, and in many would most materially augment their cost.

4th. That on some short railways, where the traffic is large, admitting of trains of moderate weight, but requiring high velocities and frequent departures, and where the face of the country is such as to preclude the use of gradients suitable for locomotive engines, the atmospheric system would prove the most eligible.

5th. That on short lines of railway, say four, or five, miles in length, in the vicinity of large towns, where frequent and rapid communication is required between the termini alone, the atmospheric system might be advantageously applied.

6th. That on short lines, such as the Blackwall Railway, where the traffic is chiefly derived from intermediate points, requiring frequent stoppages between the termini, the atmospheric system is inap-

plicable; being much inferior to the plan of disconnecting the carriages from a rope, for the accommodation of the intermediate traffic.

7th. That on long lines of railway the requisites of a large traffic cannot be attained by so inflexible a system as the atmospheric, in which the efficient operation of the whole depends so completely upon the perfect performance of each individual section of the machinery.

Lond. Railway Mag.

New Mode of Tracking on Canals.

It will be interesting to our scientific readers to learn, that steam-tugs with screw propellers, have now been successfully introduced on the Union Canal. The boats are the first of the kind introduced into Scotland. They are built of iron, by Messrs. John Reid & Co., Port Glasgow, and the engines, screw propellers, &c., are fitted up by Mr. William Napier, Sr., engineer, Glasgow. The engines, which are much admired, are on the upright principle. They communicate their power to the screws, placed on one side of the bow; and by a very nice arrangement of wheels with wooden and iron teeth, (in order to prevent noise and vibration,) they are driven at a great speed without creating any of that surge, or wash, on the banks which has hitherto formed the chief objection to the use of steamers on canals. The steamboat tried a few days ago, had attached to her six very large scows deeply laden, but it is capable of towing double the number without material diminution of speed. The scows to be tracked are connected together by rods, having a parallel movement, and all under the control of the steersman on board the steamer, so that the necessity of a separate rudder and steersman for each scow is avoided—the whole train moving along with a steady and uniform motion.

Glasgow Citizen.

Level of the Caspian Sea.

The President read the note of a Russian operation for determining the actual depression of the Caspian Sea below the level of the Mediterranean—which operation had been reduced by the eminent astronomer M. Struve, now in England, and communicated by that gentleman to him. A few years ago, it was generally believed that the waters of the Caspian Sea were at least 300 feet below the level of those of the Black Sea and Mediterranean. This view was adopted in consequence of a series of barometrical observations; but, it having been found that from the great number of stations across the land separating the Caspian from the Sea of Azoff, small errors had become greatly magnified, a new survey was made. Three able mathematicians, Messrs. Fuss, Savitch, and Sabler, were, therefore, employed to make independent trigonometrical levelings, and their observations agreeing to within a foot, or two, give, for the mean result, 83.6 English feet as the depression, the possible error being limited to 1.3 foot, which definitively settles this long pending geographical question.

Lond. Athenæum.

AMERICAN PATENTS.

List of American Patents which issued in March, 1844, with Remarks and Exemplifications. By CHARLES M. KELLER, *Examiner of Patents.*

1. For a manufacture of goods denominated *Corrugated, or Shurred, India Rubber Goods;* Charles Goodyear, city of New York, New York, March 9.

These goods are formed by cutting sheet India rubber into narrow strips, or threads, say of one-eighth, or one-sixteenth, of an inch in width, and usually of the thickness of a card. These strips are then stretched upon a suitable board, or table, in such manner as that they may pass back and forth parallel to each other, say at the distance apart of one-fourth of an inch, more or less. The table, or board, is provided with pins, or notches, at each end, and around these pins, or through the notches, the threads are to be stretched as they pass back and forth; the stretching of these strips may amount to twice their quiescent length. Whilst so stretched, two lamina of cloth, or of other suitable material, of the requisite width and length, which are covered on one side with moist India rubber cement, are to be placed one on each side of the stretched threads, the cemented sides being towards said threads; these lamina are to be brought into contact with each other between the threads, which may be readily done by passing a smooth piece of metal, ivory, or other article along the side of each of the threads.

Claim.—"What I claim as new, is the forming of such goods by the stretching of strips, or threads, of India rubber to such extent as may be desired, and the covering the said strips, or threads, on opposite sides with lamina of cloth, leather, or other suitable material, which lamina are to be united to each other, and to the threads, or strips, by means of India rubber cement, the same being effected so as to produce a manufactured article substantially as described."

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2. For a machine for manufacturing *Corrugated, or Shurred, Goods;* Charles Goodyear, city of New York, March 9.

This machine is for the purpose of making the kind of goods secured by the preceding patent, and consists of two calender rollers, geared together to insure their turning with equal velocity, and between which passes the stretched strips, or threads, of India rubber, and the two pieces of cloth, or other material, prepared as explained in the preceding patent. An endless belt of India rubber, or other elastic material passes around one of the calender rollers, and another, or stretching, roller back of it, for the purpose of pressing the two sheets of cloth together between the threads, or strips, of India rubber, and in this way the surfaces of the cloth, which are covered with cement, are made to adhere to each other, and to the strips of India rubber. Just above the calender rollers, there is a grooved roller to guide the

strips, or threads, of India rubber, and keep them at the required distance apart, and for the purpose of keeping them stretched they are attached to a sliding frame which moves towards the calender rollers, with a velocity equal to that of the periphery of the rollers.

Claim.—"To the construction of the parts of the machine I do not make any claim, nor do I claim the use of the calender rollers, similar rollers having been employed in the manufacturing of India rubber goods, and for other purposes; but what I do claim as new in the above described machine, and wish to secure by letters patent, is the combining with the calender rollers an elastic endless apron, and a stretching frame, with its appurtenances, for the purpose of giving and preserving to the strips, or threads, their proper tension, and allowing them to pass between the lamina of coated cloth, or other material, so as to produce the corrugated, or shurred, goods, as set forth."

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3. For an improved method of *Lining Metal Boxes of Carriage Wheel Hubs;* Moses Palmer, Baltimore, Maryland, March 9.

This is for lining the metal box with leather by cutting, or casting, a groove inside of the box, along its whole length, to receive and hold the edges of the leather lining. At one end this groove passes entirely through the thickness of the metal of the box to secure the leather by means of rivets, or other analogous devices.

Claim.—"What I claim as new, is the combining of a lining of leather, or of hide, with a metallic box intended to be inserted in the hub, or nave, of a carriage wheel; such lining being secured in place and combined with the metal substantially in the manner set forth, and made known."

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4. For an improvement in the *Press*, applicable to the lifting of heavy weights; Smith Cram, city of New York, March 9.

This patent is granted for improvements on a machine patented by George Kilburn, on the 23d of August, 1838, and noticed at page 93, of the twenty-fourth volume of this Journal, to which the reader is referred for a general description of the principle.

We are under the necessity of omitting the claim, as it refers to, and is so much dependent upon the drawings, that it could not be understood without them, and the general importance of the invention, in view of the difficult and complex character of the drawings, does not call for their publication at this time.

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5. For an improvement in the *Plough;* Israel Long, Bucyrus, Crawford county, Ohio, March 9.

Ploughs have long since been made with a wheel between the land side and the mould board, for the purpose of supporting the weight of the back part of the plough, and avoid a portion of the friction which wears away the heel of the plough. The improvement in question is for making this wheel adjustable by attaching its axle to

a bar jointed to a protection from the inside of the land side, and mould boards, and regulating it with a suspension screw rod.

Claim.—"I do not claim as new inserting a wheel for the purpose of relieving the heel of the land side and mould board of friction, as that has been done, but what I do claim as my invention, and desire to secure by letters patent, is the combination of the roller with the plough, in the manner described, by means of the jointed bar and rod, so as to render it adjustable."

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6. For an improvement in the *Cotton Press;* George Peck, Fairfield, Connecticut, March 9.

This is for an improvement in a press previously patented, but which has not yet been noticed in this Journal, in consequence of the hiatus in this list, which we hope to close up very soon.

The action of this press is upwards, and to the under part of the follower two rods, called "levers," are jointed, the other ends of which rods are provided with rollers that run on rails on a horizontal platform. Blocks, or pulleys, are attached to the lower ends of these rods, provided with appropriate cords, or chains, that wind around a windlas midway between the rods, or levers, for the purpose of drawing them towards each other, and thus cause them to act in the manner of a double toggle joint lever in forcing up the platten or follower, of the press, the platform taking the place of the lower arms of the toggles. Such is the press previously known, and the improvement in question is for the purpose of drawing out the rods, or levers, and drawing down the platten, which is effected by means of two springs on each side, one extending from the lower end of each rod, or lever, passing over the end of an arm jointed to and projecting from the side of the frame, and then extending up to the end of another spring projecting out horizontally from the upper part of the press frame.

Claim.—"I make no claim to the combined levers and follower, nor to the apparatus for drawing them together in pressing; but what I do claim as my invention, is the combination of the springs and levers for drawing down the follower, in the manner set forth."

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7. For an improvement in *Lamps;* Samuel Rust, city of New York, March 9.

This is for an improvement in hand and other lamps, in which the wick is raised by means of a roller, and the object is to insure the raising of the wick by the roller, which it does not always do as heretofore arranged, and to facilitate the introduction of the wick. These two objects are attained by attaching a spring to the wick tube which extends up through a hole, or recess, in the cap, made sufficiently large to give it ample play. The upper end of the spring is provided with a thumb piece, by which it can be pressed towards, or drawn from, the roller.

Claim.—"What I claim is a thumb piece, press, or slide, to manage the wick by, pressing the thumb piece, press, or slide, against the wick, or wick raiser, with the finger, or thumb, or relieving the

pressure from the wick, or wick raiser, combined with the roller, or any other wick raiser, analogous to the roller; and also the recess, or opening, in the tube, or stopper, combined with either the spring thumb piece, press, or slide, as above set forth, or in any other way which is essentially the same."

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8. For an improvement in the *Mill for Grinding Grain;* Erastus Arnold, Otsego, Otsego county, New York, March 9.

We have here an improvement in that kind of mills in which the faces of the grinders are vertical, and the nature of this improvement will be fully understood by reference to the following—

Claim.—"What I claim as my invention, is the method described of constituting the permanent, or bed, grinder, by covering only a portion of the surface with teeth, and feeding in the grain at the commencement of this grinding surface, and discharging the meal at the other, instead of grinding over the whole surface, as described."

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9. For improvements in machinery for *Folding and Measuring Cloth;* Silas C. Durgin, North Chelmsford, Middlesex county, Massachusetts, March 9.

This patent is granted for improvements on a machine patented by Joel Spalding, on the 28th of August, 1841, noticed at page 275 of volume iv, 3d series, of this Journal, to which the reader is referred.

The first improvement claimed is for an arrangement of parts by which the folders are elevated and depressed. The second improvement is for an arrangement of endless bands, (with their pulleys and shafts,) and a cross bar in combination with the bar that depresses the cloth, for introducing the cloth, and overlaping the first fold produced. The third improvement is for the method of feeding the cloth into the machine, so as to present it to the action of the folders as required by them, and with little or no strain upon them, by supporting the cloth on one or more horizontal rods, or shafts, (placed above the folders,) in combination with giving to the surface of the feed roller a motion sufficiently increased, beyond that of the folders, to cause that part of the cloth which is between the supporting rod, or rods, and the feed roller, to be loose, or hang down in proper quantity to readily yield to the irregular motion of the folders over the platform caused by the cranks of the shafts which operate the sweeps of the said folders.

We are under the necessity of omitting portions of the first and second sections of the claim, because of their reference to, and dependence upon, the drawings, but the substance has been given.

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10. For an improvement in *Cooking Stoves;* Samuel Bentz, Boonsboro', Washington county, Maryland, March 9.

This patent is for the addition of what is called a "pastry oven," below the principal baking oven; it is placed below the bottom plate of a stove, in which there is a flue space between the bottom of the

principal baking oven, and the bottom plate of the stove, and it has a flue surrounding it on four sides. There is a partition in the middle of this bottom flue space with holes, provided with a register, to allow the draught to pass directly around the principal oven, or through a hole in the bottom plate of the stove, around the pastry oven, and out through another hole in the bottom plate beyond the before mentioned partition—the two holes in the bottom plate being also governed by a register.

The claim is limited to the arrangement of the flues, in combination with the pastry oven, and sliding registers.

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11. For an improvement in the *Buckle;* Isaac B. Verplank, Mentz, Cayuga county, New York, March 9.

The object of this improvement is to avoid the necessity of weakening the strap to be held, or fastened, by making holes through it to receive the points. The buckle frame, or case, is composed of two side pieces, and two cross bars at top, one at each end, and a bottom plate extending from one end to about the middle, and midway between this bottom plate and the end of the case, a lever is jointed, by means of a fulcrum pin, which passes through the sides of the case, and a hole in the middle of the lever. One of the straps is secured by sewing, or otherwise, to a flat loop in one end of the lever, and the other strap, or the other end of the same strap, as the case may be, is passed in between the bottom plate and one of the cross pieces, then over the inner end of the lever, and then under the other cross piece at the other end. The tension of the strap causes it to be held and griped between the cross pieces of the case, and the ends of the lever.

Claim.—"What I claim as my invention, is the combination of the buckle case, consisting of the bottom, sides, and cross pieces with the lever, containing an aperture at the end, and one near the middle, the whole being constructed and operating in the manner and for the purpose described, or in any other substantially the same."

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12. For an improvement in the *Washing Machine;* Ephraim Lukens, Baltimore, Maryland, March 9.

The nature of this improvement consists in suspending a perforated swing board between the ordinary vibrating presser, and the back of the wash tub, against which the clothes are pressed, and through which the water passes to the space behind it, which water, when the presser is withdrawn, or carried to the front of the tub, by its gravity, rushes under its lower edge, and through the apertures in the swing board, strikes against the clothes, turns them over, and again percolates through them—the motion of the said swing board, when the presser board is withdrawn, also assisting in turning the clothes over in the water in the tub.

Claim.—"What I claim as my invention is combining a perforated swing board with a vibrating pressing board of machines for washing clothes, whether in the manner here described, or in any other mode,

or way, which is substantially the same, and wherein analogous results are produced."

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13. For an improvement in the mode of *Setting Kettles*, for evaporating saccharine juices, in the manufacture of sugar; Abraham Hager, Donaldsonville, Parish of Ascension, Louisiana, March 9.

The first improvement claimed is the use of spiral descending flues under the grandes, or clarifying kettles, the said flues being governed by a valve which is made hollow, and filled with water, and which is made the subject of the second improvement claimed under the patent; and the third improvement is for an arrangement of flues in combination with the form of the bottom of the granulating kettle, which is concave on the under surface. The flues are formed to correspond with the bottom of the kettle, and provided with a partition, for the purpose of preventing the heat from passing to the chimney before it has circulated around and under the surface of the concave bottom of the kettle, whose lower edges rest on the brick seat, or bed, except at a place near the partition, where a space is left open for the draught to pass under the edge of the kettle to the flue formed around the outside of the kettle.

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14. For an improvement in the mode of making the *Mould Board of Ploughs;* Harvey Brown, Payson, Adams county, Illinois, March 9.

This mould board is made of a plate in the form of a rhombus, with a curved and angular projection on two of the parallel sides, which are bent back at the requisite angle—the curved projections being for the purpose of receiving a bar by which the mould board is secured to the standard, so that it can be reversed to use either of the two edges for a share, and the angular projections answer the purpose of land sides. In the specification and drawings, several of these mould boards are described, and represented as arranged in a frame to form a gang of ploughs.

Claim.—"What I claim as my invention, is constructing the plough in the manner described; that is to say, constructing and arranging the projections upon the mould board, so that the plough may be used either side up, whether it be a right, or a left, plough. I do not claim combining a number of ploughs, and attaching them to a frame."

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15. For improvements in machinery for manufacturing *Lead Pipes;* Charles and George Escol Sellers; Cincinnati, Ohio, March 9.

"In manufacturing lead pipes by this process, the metal from which it is to be formed is fused, and poured into a receiver of cast-iron, or other metal of great strength, which receiver is heated by means of a suitable furnace, so as to preserve the metal in a fluid state. The lower part of the receiver contains a die, having an opening through it of such size as to adapt it to the forming of the outside of the pipe,

and a case, or mandrel, to determine its size, or calibre, within. It also inclosed the apparatus which is employed for the purpose of cooling the pipe as it leaves the core, and also of keeping the temperature of the core below that of melted lead, by which means we effectually prevent the combining of the lead with the surface of the core, which takes place when lead is in a fused state, and is subjected to heavy pressure. The fused lead is to be forced out by means of a ram, or plunger, made to fit the cylindrical cavity containing the lead, said plunger being brought down by means of an hydrostatic press.

Claim.—"We do hereby declare that we do not claim any of the parts of the said machinery when taken separately, with the exception of those hereinafter particularly pointed out; nor do we claim the use of the hydrostatic press, for applying the force required in the formation of the pipe; nor the use of conical dies for forming its exterior, or of a mandrel for forming its interior; nor the bridge by which said mandrel is sustained, these having been long since used, and being described in the specifications of patents obtained in England and elsewhere, and having, therefore, become public property; nor do we claim the manufacturing, or forming, of lead pipe from lead kept in a molten state whilst it is kept in the cylindrical cavity, which we have called the receiver, and also when it passes the bridge, and arrives at the conical die, and the part of the mandrel which said die surrounds, this having been before done by us, and by others; but what we do claim as our invention, is the employment of a tubular core, or mandrel, divided longitudinally into chambers, through which heated water, air, or steam, is to be passed, in the manner described, and for the purpose of preserving said core at a temperature somewhat below that of melted lead; by which device the lead is effectually prevented from adhering to the mandrel. We claim the manner of forming the packing of the ram, by attaching to its end the piece of wrought-iron rendered thin at its lower edge by forming the face of the said piece concave, for the purpose above set forth."—[The purpose here alluded to is keeping the piston tight, and preventing the escape of the melted lead around the edges of the ram, or piston.] "We claim the combination and arrangement of the parts constituting the water chamber, consisting of the tube, the bed piece, and the conical die; the supply of water thereto being given, and governed substantially as described."

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16. For an improvement in the *Spiral Submerged Propeller, for steam-ships, &c.;* Ralph Bulkley, New York city, March 13.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is giving to the inclined, or spiral, paddles an inclination from the radius, for the purpose and in the manner specified."

We deem any explanation unnecessary, as the claim points out distinctly what the improvement is.

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17. For an improvement in the machine for *Pressing Hats and Bonnets;* Caleb Merritt, Baltimore, Maryland, March 13.

The shaft on which the hat block is placed, has its bearings in a segment piece jointed to the frame, for the purpose of giving to the block any desired inclination, which is effected by a pinion that takes into cogs on the periphery of the segment piece. The hat block is provided with a mitre cog-wheel which gears into another mitre wheel on the pin that forms the centre of motion of the segment piece, that the wheels may continue in gear through the whole extent of the vibration of the segment piece with the hat block. The last named mitre wheel gears with another cog-wheel on the shaft of a ratchet wheel, the band of which is operated by a series of levers in connexion with a rock shaft, actuated by the shaft, or rod, that carries the pressing iron, and which is worked by the operator—the end opposite the handle being connected by means of a universal joint, and a slide with a gate, or frame, attached to a long arm projecting from the rocking shaft. By this arrangement the pressing iron being midway between the handle part of the shaft and its connexion with the gate, the pressing of the iron on to the hat by the operator communicates motion to the whole combination above described, and causes the block to turn with the hat on it.

Claim.—"What I claim as my invention, is the combination of the shaft which carries the pressing iron with the gate by means of the slide and universal joint, as described; and these, thus combined, I claim in combination with the rock shaft, which communicates motion to the shaft of the hat block, by the action given to the shaft which carries the pressing iron. I also claim the segment piece which carries the shaft of the hat block, and which is shifted by the pinion, in combination with the mitre wheels, &c., for the purpose and in the manner described."

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18. For an apparatus for *gathering Fruit;* Alexander McWilliams, Washington, District of Columbia, March 13.

To a disk on the end of a handle of any required length, there are four wires that project a few inches with loops at their ends; to one of these loops a cord is attached, and then carried through the loops on the other wires, and back to, and through, the first, and then passes down the handle. There are other wires placed around the disk to prevent the fruit, after being separated from the tree, from falling out. The cup formed of these wires is passed around the fruit, and then the cord pulled, which draws the upper ends of the four wires together, and enables the person using the apparatus to separate the fruit from the tree.

Claim.—"What I claim as my invention, is the combination of the grasping wires and string, with a handle of any convenient form, for the purpose of grasping objects which cannot be conveniently reached by the hand, the construction and operation being substantially as described."

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19. For an improvement in the mill for *grinding Grain;* Eli B. Nichols, and David Marsh, Fairfield, Connecticut, March 13.

Claim.—"We claim the mode of sustaining the runner stone upon the still spindle, by the bale, through the chuck; and the combination of these parts with the forked cylinder in the lower end of the driving spindle, to furnish a means of driving the spindle and runner stone from above."

The dead spindle passes up through the bed stone, and has a countersink, in its upper end, to receive a point projecting from the under part of the chuck, which is grooved out around the point to receive the upper end of the dead spindle. The under side of the bale, which is attached to the eye of the runner, has also a point which rests in a countersink in the upper surface of the chuck, to balance the runner, and the upper part of this bale is adapted to receive the forked end of the driving spindle.

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20. For a machine for giving *Exercise to Dyspeptics and other Invalids;* Oliver Halsted, New York city, March 13.

The patentee says,—"The nature of my invention consists in giving to a seat, upon which the patient is placed, an exercise similar to that given to the rider on a horse, with this difference, that, in the absence of all effort, on the part of the patient, to retain his seat upon the chair of exercise, (which absence of effort is not obtained on horse back,) he may relax the abdominal muscles, which is indispensable in order to stimulate the muscular coat of the stomach, and, at the same time, restore the peristaltic motion of the bowels, so that both secure their heathy action."

The seat may be attached, by means of a slide, to one end of a working beam, vibrated by means of a crank, eccentric, or cam, actuated by any first mover; or a seat may be attached by the same means to a car, the axle of one of the sets of wheels being cranked to vibrate the beam, and two of these cars may be attached to the opposite ends of a sweep, in the manner of what are well known as flying horses. There are various modifications described and represented.

Claim.—"What I claim as my invention, is the giving of an undulating, or jolting, motion to a chair by means substantially as herein described, for the purpose of curative treatment of dyspeptics, and other invalids, and for healthful exercise. I do not mean to confine myself to the precise form of construction of the individual parts, but vary them as I may have occasion, without departing from the general principles of action herein set forth, to wit, the giving of an undulating, or jolting, motion to a chair in contradistinction to a rocking, or oscillating, movement of the same, of which several examples of such variations are represented and specified."

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21. For an instrument, or pattern, for *Cutting Boots;* Thomas Cranage, Warren, Trumbull county, Ohio, March 13.

Claim.—"I do not claim the extension of a pattern by sliding one piece upon another, fastened together by nuts and screws; but what I do claim as my invention, is the combination of the slides with the plates having graduated scales thereon, in the way described, the

whole being constructed and arranged in the manner and for the purpose set forth."

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22. For an improvement in the *Rake for gathering Grain;* Benoni F. Patridge, Onondaga, New York, March 13.

The "handle, or stale, is formed of a stick of natural, or artificial, bend, commencing at the head of the rake, with a slight curvature, and gradually increasing about two feet, where the band is increased to near a quarter circle, thence for about two feet with a very slight bend upwards, where it is suddenly bent so as to have the extreme end of the stale in nearly a perpendicular position, affording an easy hold for the upper hand of the operator, whilst his lower hand is on a double thole about two feet from the head of the rake, and by which he draws the instrument forward. The object of the double thole is to enable the operator to work on either side of the rake."

Claim.—"What I claim as my invention, is the combination of a grain rake of the above described construction, with a curved handle —said handle being curved in the manner set forth, or any other substantially the same, in which the operation would not be changed, the whole operating as set forth."

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23. For an improvement in the machine for making *Brooms;* Jacob H. Hinton, Lancaster, Penna., March 13.

The bundles of broom corn for two brooms, are put into boxes on a carriage, to be presented to the wrappers, and pressed down by a presser, or brake, which is held down by a hook, and then presented to the wrappers, which are somewhat like the flyer of a spinning machine, the twine being passed through the shaft, and then through the hollow arm that carries it, and wraps it around the bundle of corn, the brake being first removed, and the carriage having a movement from the wrappers by means of a screw, to lay the twine regularly.

Claim.—"What I claim as my invention, is the combination of the rests, or pedestals, pressers, and brake, for pressing and holding the broom corn. I also claim the combination of the brake on the carriage, for holding the broom corn, in combination with the wrappers, as set forth."

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24. For an improved mode of *Fastening the Check, Pad, or Water Hook, of the Pad, or Saddle, of a Harness;* Abel B. Buell, Westmoreland, Oneida county, New York, March 13.

This is for fastening the check hook to the pad, or saddle, by a dove-tail turning joint, instead of riveting, as heretofore. The stem of the hook has flanches, and that part of the pad to which it is to be attached, has a hole, one part of which is sufficiently large to permit the flanches to pass through, and the other of the width of the stem above the flanches, so that after the flanches have been put in, and pushed under, and the hole through which they were introduced closed up, the hook is retained in place without rivets, or screws.

Claim.—"What I claim as my invention, is the manner of fastening and securing the check hook and loop for the back strap, and for nothing else."

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25. For an improved mode of inserting *Artificial Teeth;* J. Smith Dodge, New York city, March 13.

Claim.—"What I claim as my invention, is the mode described for inserting artificial teeth, that is to say, by inclosing a metallic tube within the wooden plug, or cylinder, commonly employed in fixing artificial teeth, the wood and metal being both inserted in the stump, or root, substantially in the manner described, the said metallic cylinder constituting the socket for the pivot."

The pivot attached to the artificial tooth is of metal, and is received in the metallic cylinder in the wooden plug inserted in the stump of the natural tooth.

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26. For a *Label for Mail Bags, &c.;* Oren S. North, New Britain, Hartford county, Connecticut, March 13.

Instead of having two separate labels for a mail bag used to transmit letters back and forth between two places, say Boston and New York, these two labels are connected together by a joint, so that the names on either one of these labels can be put outside, and the other concealed."

Claim.—"What I claim is uniting two labels by a joint, for the purpose described, using, therefor, the double hinge joint, or any of the known modes of effecting the same end."

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27. For an improvement in the machine for *Brushing and Winding Cloth;* Reuben C. Varnel, West Somers, West Chester county, New York, March 13.

Claim.—"What I claim as my invention, is the combination of the revolving cylinder of brooms with the weighted roller, adjustable roller, and revolving winding board, as described, for brushing and winding cloth, whether combined and arranged in the manner herein described, or in any other manner substantially the same, by which analogous results are produced."

The rollers are for the purpose of passing the cloth in a distended state under the board, and as the winding board is known to all who are acquainted with manufactures, we need not describe it.

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28. For an improvement in the mode of regulating the *Burning of Alcohol, or other inflammable liquids*, when used for vapor bathing, and other purposes; Lucien E. Hicks, Middletown, Connecticut; assigned to Giles L. F. Griswold, March 16.

This apparatus consists of a circular vessel, the cover of which, within the rim, is curved upwards, and then down with a short cylindrical tube of one-third its diameter, rising from the middle, and having small apertures to admit the inflammable matter from the pan,

or reservoir, to be ignited therein, and a turning disk valve to regulate the intensity of the combustion. A perforated ring for admitting air is placed on top of this pan, and above the ring is placed the vessel containing the medicated materials to be evaporated, and over this a cover, with a small pipe and holes, to conduct off the vapor. The person who is to receive the vapor is placed on a stool above this apparatus, and properly surrounded, as is well known to all who have taken vapor baths.

Claim.—"What I claim as my improvement, is the method of regulating the burning of alcohol, or other inflammable liquids, by means of the application of apertures and valves, as above set forth and described, when applied to vapor bathing, or other purposes, separately, and also in combination with a chamber, or reservoir, for holding the inflammable liquid that is to be conducted and burned at the apertures, and gradually supplying the same therewith during the process of combustion, constructed and operating as above described, so as to prevent ignition."

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29. For an improvement in the *Cotton Press;* Seth Lamb, New York city, March 16.

This is for improvements on a press, patented to the same person on the 12th of May, 1843, and which will be noticed as soon as we can bring up the arrears of this list of patents, and, therefore, the claims only of the improvements will be inserted at present, as the notice and description of the original invention will explain the whole.

Claim.—"What I claim as my invention, is the combination of the palls and racks with the foot block of a press constructed and arranged in the manner described. I also claim, in combination with the movable foot block, the segment and lever by which it is connected with the main lever, in the manner described. I lastly claim the employment of the pulley bed on which the bale rests, constructed and arranged as before described, so that it shall remain in its position until the bale is pressed, when it falls out of the way until the bale is tied, and the lever connected with the head block starts back."

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30. For an improvement in the *Harpoon for taking Fish;* Albert Moor, Hampden, Penobscot county, Maine, March 16.

This invention consists in jointing the fluke to the stem of the harpoon, and putting a vial of explosive mixture in a hole in the fluke, so located that on the opening of the fluke the vial is broken, and the mixture exploded. After the vial has been put in, the flue is closed and secured by a wooden pin, and after the harpoon has been forced into a fish, the pull opens the fluke, and causes the explosion to take place within the fish.

Claim —"What the subscriber claims as his invention, is placing in the fluke of said harpoon, a vial of explosive mixture, of whatever materials, or ingredients, it may be composed, for the purpose and in the manner described."

31. For an improvement in the *Portable Furnace;* George E. Waring, Stamford, Fairfield county, Conn., March 16.

The patentee says,—"My portable furnace I make of cast-iron, and in its general construction it resembles such as have been heretofore made. My improvement consists in the combining with the body of the furnace either a rotary, or a stationary, rim, so formed as in conjunction with the shape given to the upper edge of the body of the furnace, to constitute a flue space, the opening into which is through what I call the collar part of the rim; although this rim may be made stationary, I prefer, in all cases, to make it rotate, and shall describe it as being capable of doing so. By means of this device the heated air from the burning fuel is made to pass around the above named flue space before it is conducted off, and the heat is thereby much economized."

Claim.—"What I claim as new in this furnace, is the forming of a flue space around its upper edge, by a projection from the body of the furnace, in conjunction with the rim, or in any other manner that is substantially the same; and this I claim whether the rim be made to rotate in the manner described, or whether it be permanently fixed with the opening towards the front of the furnace."

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32. For improvements in *Stoves for Cooking and Heating and Ventilating Buildings;* John Woolley, Springfield, Hampden county, Massachusetts, March 16.

A double case surrounds a stove of ordinary construction, the inner part of the double case being so much larger than the stove, as to form an oven with shelves, through which the pipe of the stove passes, and from which it extends to the top of the house, and there is a hole from the oven into the pipe for conducting off the fumes, vapor, &c., from the cooking. The door to the oven is double as well as the rest of the case which surrounds the oven, and the space between the inner and outer cases, and the double door, are provided with holes at the bottom to admit air from the room, which, after being heated, passes into a space between the smoke pipe and an outer pipe which surrounds the smoke pipe, and which also extends above the roof of the house, where a cap covers both of them for the purpose of increasing the draught. This outer pipe is provided with branch pipes for conducting the heated air into different apartments, and above these branch pipes there is a box and valves for preventing, or permitting, the escape of heated air from the space in the case.

Claim.—"What I claim as my invention, is the combination of the case and stove in the manner described, the pipe of the stove passing up through the centre of the case, and having a hole therein for the purpose set forth. I also claim carrying the two pipes out above the roof together, and covering them both with a cap, constructed, combined, and arranged in the manner and for the purpose set forth. Lastly, I claim, in combination with the above, the valve box and valves near the top of the house, for closing the outer pipes."

33. For improvements in the method of *Suspending and Working Lock-Gates for Canals;* Henry McCarty, Pittsburgh, Pennsylvania, March 16.

Instead of supporting the gate on a railway at the bottom of the lock, it is balanced by means of a stirrup jointed to the outer edge of the gate, and to a rod by means of a swivel and screw for adjustment, the rod being jointed to the top of a post sustained by hog chains; and for the purpose of opening and closing the gate there is a triangular lever jointed to the gate at both ends, the third angle of this lever being provided with a roller that runs on a circular railway, equal, in radius, to the sweep of the gate, (the lever being an equilateral triangle,) and placed on the embankment of the lock. A chain is attached to the outer end of the gate, passed around a pulley and windlas on the embankment, and then made fast to that angle of the lever which runs on the railway.

Claim.—"What I claim as my invention, is the before described mode of suspending, and opening, and closing gates for locks, and other places, by means of the aforesaid combination and arrangement of the inclined post, rod, swivel, stirrup, and hog chains; and the triangular lever, segment way, cord, pulleys, and windlas by which the expense of construction is reduced, and the old railway and rollers at the bottom of the lock, and the chains for opening and closing the gates placed in the water, where they are subjected to constant oxidation, and where they cannot be reached without much difficulty when out of order, are entirely dispensed with."

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34. For an improvement in the method of applying *Circular Saws to the sawing of large timbers;* John K. Mayo, Orrington, Penobscot county, Maine, March 20.

We refer the readers to the claim, which is sufficiently explicit to convey a clear idea of the improvement patented.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of two, or more, circular saws, every preceding one of less diameter than the next following one, their respective axes being on a common level, or two sets, or series, of saws of that description, one above the other, for the purpose of sawing together in the same scarf, lumber, &c., in an easier and better manner than heretofore done, the whole being constructed and operating as herein above set forth. I do not claim the application of two saws only, one above the other, for the purpose of sawing together in the same scarf."

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35. For an improvement in the machine for *Cutting Shingles, &c.;* William Wood, Westport, Connecticut, March 20.

This is for an arrangement of parts for moving the carriage which carries the block to the knife, by the motion of the knife gate, which has a reciprocating movement up and down. A rack on the side of the gate takes into the teeth of a pinion on a shaft provided with a

crank that communicates a reciprocate movement up and down to a slide, the upper end of which has a cross head with a horizontal slot in it, a little longer than the length of movement of the carriage. This slot receives the wrist of a crank on the end of a shaft provided with appropriate cams for feeding the block to the knife in such manner as to cut the butt of the shingles alternately from opposite ends of the block.

Claim.—"What I claim as my invention, is the combination and arrangement of the head block with the shaft, cams, carriage, and cross head, rack and pinion, arranged in the manner, (or that which is substantially the same,) and for the purposes set forth and described."

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36. For an improvement in *Door Plates;* John H. Grout, and Fowler M. Ray, New York city, March 20.

This improvement is for the purpose of rendering door plates visible by day and night. A hole of the requisite size is cut in the door, a plate of glass is put on the outside, within that another plate of glass with the name, or direction, painted on it, and back of this a reflector is hinged, which, by means of a button, can be brought up parallel with the glass plates to answer as a back ground for the day, or thrown down horizontally and at right angles, or more, to answer as a reflector for the night, there being a corresponding mirror above, and a plate of ground glass covering the opening on the inside of the door. The rays of light from a lamp within pass through the ground glass, and are reflected on the lettered glass.

Claim.—"What we claim as our invention, is the particular manner in which we have combined the reflectors with the device of a night door plate, as described—the distinctness of the lettering of the same being brightened by the illuminated light reflected by the mirrors by day, or night."

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37. For an improvement in the machine for *Thrashing and Cleaning Grain;* Luther Whitman, and Ezra Whitman, jr., Winthrop, Kennebec county, Maine, March 20.

For an explanation of this improvement, we refer to the following claim, viz.,—"What we claim as new, is the manner in which we have combined the vibrating screen with the machine, by placing it between the concave of the thrashing apparatus, and the endless belt of revolving slats, and below the conveying cylinder, so as to operate in the manner and for the purpose set forth; we do not claim any other part of the apparatus as of our own."

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38. For an improvement in the *Truss for the cure, or relief, of Inguinal Hernia;* David Sabins, Lancaster, Penna., March 20.

Claim.—"What I claim as new, is the manner set forth of connecting the pad, or pads, to the principal spring, by means of a double jointed link, contained within a cavity on the back part of the pad,

arranged and operating as described and represented. I also claim, in combination therewith, the manner of adjusting the pressure of the pad by the aid of the regulating bridge piece, by means of which the link may be made to bear on either side of the centre of the pad, or pads, as may be requisite."

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39. For an improvement in the machine for *Cleaning Grain;* James M. Clarke, Strasburg, Lancaster county, Penna., March 20.

This is for an alleged improvement on that kind of smut machines which have the beaters attached to a vertical shaft working within a vertical cylinder, and a fan attached to the beater shaft below the beaters. The beating part of this machine consists of a hollow metallic cylinder, with valves attached to the inner periphery, converging towards the centre, and extending to within a short distance of the shaft, and with beaters attached to the outer periphery tangential to a circle smaller than the cylinder, and shielding apertures made in the cylinder between the junctions of the beaters and valves with the cylinder.

The fan and cylinder of beaters, are separated by a part of the casing, which also surrounds the beater cylinder and fan. The grain is conducted by a spout, at one side, from the hopper to the upper part of the casing which surrounds the beaters, and discharges into a spout at the opposite side, which extends from the fan case to the top of the machine for the discharge of foreign matter, and below the fan case for the delivery of the cleaned grain. There is also another spout extending from the fan case to the spout, which conducts the grain to the beater cylinder.

Claim.—"I do not claim in the above described machine, making an outward blast by internal fans, as that has been done, but in a cylinder different from mine; but what I claim as my invention, and desire to secure by letters patent, is constructing the cylinder in the manner described, with valves on the inside, creating a blast outward through apertures made therein, as above described, and shielding said apertures by inclined beaters, as before specified, and reversing the same on the shaft. I also claim the combination of the vertical spouts with the fan, in the manner and for the purpose herein set forth, and constructed substantially as described."

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40. For an improvement in *Lamp Caps;* Francis Draper, East Cambridge, Middlesex county, Mass., March 20.

This is "for the purpose of preventing the oil that rises through the air tube, or otherwise, from running over and down the exterior of the lamp, by extending the perimeter of the cap upwards around the wick tubes to a proper height to form a deep cup, the sides, or rim, of the cup being bent, or curved, in, towards the wick tubes, in any manner to hold the oil. The screw plate of the wick tubes forming the bottom of this cup."

Claim.—"I claim forming an oil cup about the wick tubes, and above the top of the plate of the same, by extending the perimeter,

or exterior, rim of the cap upwards, as herein before specified, and for the purpose herein above set forth, thereby superceding the use of a screw in such place, as will allow the oil to get to the outside of the lamp."

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41. For improvements in *Kitchen Ranges and Grates;* Ambrose W. Thompson, Philadelphia, Penna., March 20.

This improvement is for a mode of altering, at pleasure, the capacity of the fire chamber, by making a recess at the bottom of the fire back, to receive and permit the bottom bars and back rail of the grate to slide in and out, and making notches in the upper edges of the cheeks, or jambs, of the fire chamber, to receive projections from the ends of the upper front bar of the grate.

Claim.—"What I claim as new, is the manner described of altering the capacity of the fire chamber of my improved range, by forming notches in the upper ends of the cheeks, and recesses under the fire back. I do not claim the altering the capacity of such a fire chamber, abstractedly, but limit my claim to the manner of doing this, as herein made known."

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42. For an improvement on Nelson Johnson's *Water-Wheel;* Hiram Ferguson, Richland, Oswego county, New York, March 20.

The claim in this patent is limited to an alleged improvement on a water-wheel patented by Nelson Johnson, on the 30th of May, 1838, and noticed in this Journal at page 243, of the twenty-third volume, and as it consists simply of a change of form in the buckets, we will simply refer the reader to the notice of the above named patent, and to the following claim:—

"I do not claim the gradually enlarged buckets, as used in Nelson Johnson's water-wheel, and others in use; but what I do claim as my invention, is the peculiar manner in which I form the issues of my buckets; that is to say, by making the inner curves of the buckets, or those nearest the centre, segments of a circle which is concentric with the circumference of the wheel, and of lesser diameter; and the outer curves of the buckets, or those that are farthest from the centre, segments of circles of the same diameter, described from the points XX, (ranged on the periphery of the shaft,) the inner and outer sides of the buckets being spherical triangles, and nearly vertical, when the wheel turns in a horizontal position."

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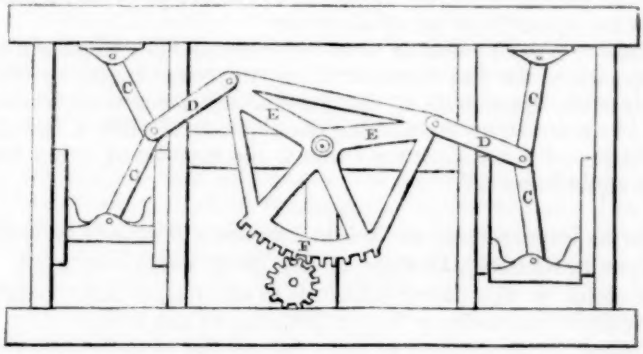
43. For an improvement in *Presses for Cotton and other Substances;* Perry G. Gardiner, New York city, March 20.

The following claim, and accompanying sketch, will enable the reader to form a clear notion of this improvement:—

Claim.—"I hereby declare that I do not claim to have made any improvement in the single press; nor do I claim either of the parts, or devices, herein described, when taken alone, but what I do claim as of my invention, and desire to secure by letters patent, is the combining of one, or more, pairs of such presses, so as to give to the fol-

lowers, or plattens, of each pair, an alternating, or reciprocating, motion, by an arrangement of the operating parts, such as is represented in the drawing; that is to say, by the combined operation of the segment F, on the beam E E, and on the double toggle joints formed by one arm of the beam E, the shackle, or lever, D, and the progressive levers, or toggle joint, C C; the whole being combined and operating substantially in the manner, or on the principle, set forth. I do not claim the mere employment of double toggle joints to work two plattens, or followers, this having been before done, but in a manner essentially different from, and not producing a like effect with, that above described."



44. For an improvement in *Piano Fortes;* Ottaviano Gori, and Philip Ernst, New York city, March 26.

This improvement consists in methods of arranging pieces of glass, to be struck by hammers in manner similar to a piano forte. In one arrangement the pieces of glass are suspended from the sounding board by two wires, one near each end—the wires projecting down from a bearer in the sounding board, and having nuts at their lower ends to support the glass—the hammers striking from above, or below: and the other arrangement consists in stretching wires across from bearers, or studs, at each end, and securing the pieces of glass to the wires, by means of elastic glue—the hammers being arranged above.

Claim.—"We do not intend to claim the use of glass for musical purposes, nor do we intend to claim the mode of fitting the action parts; but we do claim as new, and of our own invention, first, the mode of mounting and adjusting the glass notes by the bearing, or suspending, bars, and the small wire rods and nuts, when applied to use in piano fortes, having either an under, or over, action, either separately, or in conjunction with wire, or string, notes; second, the mode of mounting, or suspending, the glass notes by the bearers, or by the strings, or wires, in combination with the mode of retaining such notes in place by elastic glue, made as described, when applied to piano fortes, having a downward action, such glass notes and mode

of suspending and retaining, to be either used separately, or in conjunction, with wire, or string, notes."

45. For an improvement in *Mill Bushes;* John Heck, Boonsboro', Washington county, Maryland, March 26.

This bush is made in wedge formed segments, with a rod extending down from each segment, and passing through and being secured to a plate below, by means of nuts above and below, for the purpose of adjusting each segment separately; and for the adjustment of the whole together this plate is suspended by means of screw rods and nuts from the box of the bush.

Claim.—"What I claim as my invention, is the method of adjusting the segment bush to the spindle, and sustaining the same in the position required, by means of the screw rods and nuts, in combination with the stationary frame and box constructed and arranged as above set forth, or in any other mode substantially the same, wherein analogous results are produced."

46. For an improvement in the *Refrigerator*; David Evans, Philadelphia, Penna., March 26.

Claim.—"I do not claim to have made any improvement in the general construction of the refrigerator, but intend to finish and arrange the interior thereof in any of the ordinary forms; but what I do claim as new, and desire to secure by letters patent, is the manufacture of refrigerators, as set forth, by the combining of a lining of slate, with a box, or outer case, of wood, substantially in the manner and for the purpose made known."

47. For an improvement in *Roofing Houses with Tin ;* John Woolley, Springfield, Massachusetts, March 26.

Claim.—"What I claim as my invention, is constructing metallic roofs without boarding, by means of strips fastened to the rafters by cleats, to which the sheets of tin forming the roof are attached. I also claim the shield plate under the eaves, constructed and arranged in the manner and for the purpose described."

The strips of tin are fastened on the top of each rafter, and extend from end to end, with the two edges turned up, and to these edges the sheets of tin forming the roof are connected by lapping over these edges, and then turning down; and the shield plate referred to in the second section of the claim, is for catching and conducting into the gutter all the moisture that condenses under the roof. For this purpose a plate extends from the gutter under the roof, there being sufficient space between this plate and the lower edge of the roof for the water, thus collected, to pass out.

48. For an improvement in *Stoves for heating and culinary purposes;* Loammi Bailey, Boston, Mass., March 26.

This stove is divided into an upper and a lower fire chamber, the

former for burning coal, there being a basket grate in the plate that separates the two chambers, and the latter for wood, the draught for this latter passing through a hole, or pipe, in the division plate. The basket grate of the upper division is provided with culinary utensils. The draught of the two passes out through a pipe in the upper chamber common to both. By this arrangement either wood, or coal, can be used, or both, at pleasure.

Claim.—"I claim the combination with the partition fitted air-tight between the two fire chambers, as herein described, or the forming in said partition of a smoke pipe, or flue, communicating between the two fire chambers, the whole being arranged and operating substantially as herein specified, for the purpose set forth."

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49. For an improvement in the machine for *Cutting Sausage Meat;* William Pittenger, Rome, Richland county, Ohio, March 26.

A conical shaft, set around with pins, arranged spirally, and slicing knives towards the end, is placed horizontally in a box of an appropriate shape, to receive the meat through a hopper at one end, and discharge it at the other. The sides of this box are provided with knives that lie between the pins on the shaft, and by which the meat is sliced when forced against them by the pins, when the shaft is rotated—these sides being connected with the box by means of screws to set the knives.

Claim.—"What I claim as new, is the adjustable side pieces armed with knives, in combination with the revolving shaft, constructed and arranged in the manner and for the purpose set forth."

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50. For an improvement in the *Water-Wheel;* Nelson Johnson, Rathboneville, Steuben county, New York, March 26.

This improvement, like the other water-wheel noticed above, consists wholly in the form of the buckets, which cannot be clearly expressed in words, and as it is not deemed of sufficient general importance to give the drawings, we will simply insert the claim for the benefit of those who, having seen the wheel, may be desirous of knowing the limits of the claim.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the scolloped, hollow frustrum of a cone rim, with the spherical tapered buckets, and scolloped plate, in the manner and for the purpose set forth."

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51. For an improvement in *Weavers' Temples;* Isaac C. Lane, Waltham, Middlesex county, Mass., March 26.

Instead of a single wheel with sharp teeth projecting from the face, and ranged near the periphery, under this patent there are two crown cog wheels for each temple, one above the other, the under one placed horizontally with the cogs on the upper face, and the other placed above it, with its face making an angle of about ten degrees with the face of the under one, so that the cogs of the two mash together only on one side. The upper surfaces of the cogs are grooved

parallel with the circumference of the wheels. The frame in which these wheels are mounted is so formed with a lip on each side, where the cloth enters to pass in between the teeth of the two wheels, and pass out, as to guide the selvage of the cloth. The object of this improvement is to avoid the injury which is alleged to be done to the selvage of the cloth by the pins used in the old temples.

Claim.—"What I claim as my invention, is the combining of two cog wheels together, the cogs of which are notched to prevent the cloth, held between the two wheels, from being drawn out, and these thus combined, I also claim in combination with the guides, for the purpose and in the manner described."

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52. For an improvement in *Hooks and Eyes*, to prevent them from unlocking; Elisha C. Savage, Hartford, Conn., March 26.

The hook is flattened, and instead of closing, or bringing, the two sides together, as in the ordinary way, the sides are separated from near the eyes, to a point just beyond the turn where they are curved, or swelled outward, forming segments of a ring, and then closed in again to make the point—the swelled part being wide enough to prevent the eye from passing on, or off, without springing them in.

Claim.—"What I claim as my invention, is constructing a hook in the manner described; the sides of said hook being separate, from just beyond the eyes thereof, to a point beyond the last turn of the hook, where the sides recede from each other, forming projections, over which the eye can only pass by springing in the sides of the hook, arranged in the manner and for the purpose set forth."

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53. For an improvement in the *Lamp* for burning lard and other concrete fats; John Lobin, Bloomfield, Essex county, New York, March 26.

In this lamp the lard, or other fat, is to be fed up by means of a packed piston, which is worked up and down by a vertical screw extending from the bottom to a little above the top of the reservoir. The piston is packed to prevent the escape of the lard, &c., and the screw, by which it is worked up and down, is hollow from the bottom to near the top, where it is pierced to permit the air to escape and pass in when the piston is forced up, or down. The screw also answers the purpose of a heat conductor. The wick holders are attached to a ferule slide, through which the screw passes, to prevent the wicks from coming in contact with the screw.

Claim.—"What I claim as my invention, is the combination of the cups, or piston, with the perforated screw stem, constructed and arranged substantially as described, and also, in combination with the cup piston and screw stem, the slide as above described."

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54. For a *Composition of Matter for making Aqueducts*, for conveying water, gas, &c.; Gideon Myers, Bridgewater, Oneida county, New York, March 28.

Claim.—"What I claim as my invention, is the before described composition of gravel, clay, water, lime, and salt, for making aqueducts, cistern pipes, tubes, and other articles."

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55. For an improvement in the *Stove, or Heating Apparatus, for burning anthracite coal;* John Smart, Philadelphia, Pennsylvania, March 28.

The fire chamber of this stove is the frustrum of an inverted cone, with the upper end bell-mouthed; this is placed within a hot air chamber, in the usual manner. The improvement claimed is in the substitution, for the common grate, of a perforated conical ring, suspended near the bottom of the conical fire chamber by journals attached to its greatest diameter, so that by attaching a shaker to its lower edge the ashes can be shaken out. The bottom of this rim, or basket, is either provided with a fire grate, or a series of perforated conical rims can be placed, one within the other, at small distances apart from each other.

Claim.—"I do hereby declare that I do not claim any of the devices described, as of my invention, with the exception of that for sustaining the fire coal within the heater, and of agitating the same; that is to say, I claim the circular rim formed as described, and suspended within the heater, so that it can be agitated by means of the shaker bar operating on its lower edges; secondly, I claim the combining with the said rim any number of similar rims attached to the shaker bar, as set forth, or, instead of the rims, the combining of the said rim with a grate of the ordinary form, with small bars and openings, by means of which arrangement I am enabled to burn the finer siftings of anthracite as effectually and advantageously as the nut, egg, or other sizes, of this coal."

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56. For an improvement in the machine for *Cleaning Wool, and applicable to Cotton;* Silas G. Mumford, North Providence, Rhode Island, March 28.

The wool is to be cleaned by the revolution of a tooth cylinder revolving within a case, to which it is fed by an endless apron below and through an aperture in the side of the machine. The moats, burs, &c., and the wool which is not cleaned by the first cylinder are thrown with some violence towards the back of the machine, where they may be acted upon by other cylinders, or thrown back into the machine, to be acted upon by the first a second time. The light and cleaned wool is carried up over the first cylinder, and out through a hollow trunk extending from the back of the cylinder under the feed apron, and out at the front, a strong current of air being produced in this trunk by the revolution of the toothed cylinder.

Claim.—"What I claim as my invention, is the manner in which I have arranged and combined the cylinder with its concave, the feeding apron and rollers by which the wool is presented to the action of the teeth on the cylinder, and the hollow trunk through which the cleaned wool is passed and delivered by the current of air created by

the revolution of the cylinder. I also claim the combining with the above claimed machine, the auxiliary cylinders with their appendages, operating in the manner and for the purpose made known. I do not claim the use of toothed cylinders, or of a feeding apron, or of either of the parts of the said machine, when taken individually, but I limit my claim to the combination and arrangement of the said parts so as to constitute a machine constructed substantially as described."

57. For a composition of matter for making *Bricks;* Nathaniel J. Wyeth, Cambridge, Massachusetts, March 28.

The object of this composition is to produce bricks which will admit of driving nails into them, to avoid the necessity of introducing in walls what are known amongst mechanics as "wooden bricks."—This composition consists of "clay mixed with either sawdust, charcoal, peat, or tan-bark, after it has been used by the tanner. The proportions may be varied, but the patentee recommends three parts of clay, to five parts of either of the combustibles above mentioned.

Claim.—"I do not claim mixing combustible materials with clay for making bricks, but I claim mixing them in such proportions as will produce bricks possessing the above named properties."

Patents Re-issued for Amendment.

1. For an improvement in machinery for *preparing and spinning Flax and Hemp;* Moses Day, Roxbury, Mass., March 30.

As this patent was only re-issued for amendments in the specification, the reader is referred to the notice of the original patent, which will be found at page 404 of this Journal, vol. i, of the 3rd series.

List of Improvements added to Existing Patents.

1. For an improvement in the *Hand Bench Plane;* William Foster, Washington, District of Columbia, March 16.

This is for an improvement added to letters patent granted to the said William Foster on the 24th day of November, 1843, (which has not yet been noticed in this Journal,) for a mode of lubricating the face of a cast-iron plane by making a recess forward of the bitt, into which is fitted a piece of bees-wax, tallow, &c.; and the improvement now claimed consists in making two such recesses either forward, or back, of the bitt, or both back and forward of it.

Claim.—"What I claim as my improvement, is constructing the plane stock, as above described, with one or more recesses formed in the face thereof, either before, or behind, the plane iron, in addition to the recess, as described, (in the original letters patent,) or both before, or behind, said iron, arranged substantially in the manner and for the purpose set forth."

2. For improvements in the *Cooking Stove;* Daniel Williams, Troy, Renssalær county, New York, March 26.

This is for an improvement which has been added to letters patent

granted to the said Williams, on the 21st day of November, 1840, and noticed in the third volume of this Journal, third series.

The patentee says,—"This improved stove, like that described in the said letters patent, consists of two parts, the one stationary, the other movable; the former contains the oven, the latter is the fire place, or cooking stove, with its appendages. The oven is elevated a little above the level of the top of the fire place, having a passage provided underneath extending from front to rear, into which a part of the fire place, or cooking stove, consisting of its flue and top plate, to the extent of the passage, is made to pass in and out, as the fire place, or chamber, is moved backwards and forwards in a right line upon the hearth, or platform, on which the standard plates of the oven are fixed."

Claim.—"What I claim of the above described improvements, and desire to secure by letters patent, is the grate placed in the flue leading from the fire place, or chamber, of the cooking stove to the oven, constructed and operating in the manner above described."

List of Patents granted for Designs, under the third section of the Act of August 29, 1842.

1. For a design, or figure, to be printed, or stamped, on painted cloth, or canvas, or other fabric, which are termed *Floor Oil-Cloth Carpeting;* Jacob D. Edwards, Elizabethtown, Essex county, New York, March 20.

As these designs are generally very complex, and often depend on coloring, the publication of them would carry this work beyond its limits, and without the plates it would be useless to insert the claim: we shall, therefore, simply insert the object of the designs, the names of the patentees, and the dates of the patents.

List of American Patents which issued in the month of September, 1841, *with Remarks and Exemplifications. By* CHARLES M. KELLER, *Examiner of Patents.*

(Continued from Page 255.)

29. For an improvement in the mode of making *Potash;* Daniel B. Turner, Florence, Erie county, Ohio, September 18.

The patentee says,—"In the old process of making potash six boilers and three furnaces have been used—one furnace having been kept constantly in operation, during the day, for heating the boiler containing the weak lye for melting down the leach, and the other two furnaces kept in operation for heating the four boilers containing the lye to be boiled down into potash. My improvement is designed to do away with all the fires and furnaces except one, whereby I reduce labor, curtail expense, and quicken the operation of making potash, and obtain a greater yield of the article, which I effect in the following manner:—

"There are two boilers, one beyond the other, with a flue from the furnace, which, after passing around and under them, has three branches, one leading under and around the third boiler, and the other two branching off, one on each side, to carry off the smoke, &c., without passing under the third boiler, and which also receives the heat, &c., that passes through the flue under the third boiler, by means of connecting flues. These various flues are provided with dampers to regulate, or close, them, as required."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is making the furnace with the two covered lateral, or branch, flues, in combination with the connecting flues furnished with dampers for regulating the degree, and changing the direction, of the heat, under and around the boilers, as described."

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30. For an improvement in the *Pile Driver;* Robert N. Benson, New Orleans, Louisiana, September 18.

The object of these improvements is to make the pile driver continuous, and, therefore, more rapid in its action, which is effected by substituting two endless chains, connected together by rods, for the common mode of lifting the monkey, or hammer. The double chain passes around a driving drum at the bottom, connected by appropriate cog-wheels, with any first mover; from this drum it extends up to, and passes over, a drum near the top of the frame, and from this it runs, at an angle of about forty-five degrees, to another drum, and from this latter to a fourth drum back of it, which conducts it to the first, or driving, drum. The monkeys, or hammers, two, three, or more, in number, are provided with a hook jointed to them by the lower end, and hooked at the upper end, so as to catch on to the rounds of the double chain. There are two ways, one for the ascending, and the other for the descending monkeys, and these are separated by a spring guide on each side. The moment a monkey falls, the hook drops over and is caught by some one of the rounds of the double chain, by which it is pulled into the ascending way, the spring guides being pushed into their grooves by the sides of the upper part of the monkey, which are inclined for that purpose. When the monkey reaches the top it is carried over the upper ends of the spring guides by the inclined portion of the chain's passage, and as the hook is carried over the third drum, it is brought in contact with an inclined stop, which lifts it from the chain, and liberates it. In this way any number of monkeys, or hammers, can be worked in proportion to the length of the chain.

Claim.—"What I claim as my invention, is the method of raising the monkeys, or hammers, in succession, by means of the endless chain, or belt, constructed and operating as described. And I also claim the double spring guide constructed in the manner and for the purpose described."

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31. For an improvement in *Prismatic Pavements;* John Abbott, Wilton, Hillsborough county, New Hampshire, September 25.

The blocks, whether of wood, or stone, are, as the title in the specification indicates, prisms of either four, or six, sides. If of four sides, two of them are grooved, to receive the tongues on the contiguous blocks, and the other two tongued to fit into grooves in other contiguous blocks; but if they are six sided prisms, then three sides are grooved and three tongued.

Claim.—"I shall claim constructing the prismatic blocks of pavements with grooves and tongues on their sides, by which they may be connected together, the whole being arranged substantially in the manner and for the objects, or purposes, set forth."

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32. For improvements in the *Corn Sheller;* Pierson Reading, Batavia, Clairmont county, Ohio, September 25.

We simply insert the claims, as they will indicate to the reader the character of these improvements with sufficient distinctness, viz.,—"What I claim as my invention, and which I desire to secure by letters patent, is first, the arrangement of the endless inclined feeding belt, with iron plates fixed thereto, in combination with the upward inclining hopper, and the revolving spur wheel turning in said hopper for adjusting the ears, so as to cause them to approach the sheller endwise, and these, in combination with the sheller and double springs, for shelling several ears at the same time, and the endless open cob conveyer, as described; secondly, the arrangement of the hinged shutter at the head of the inclined plane for yielding to an accumulation of ears, so as to permit the endless conveyer to work freely, as described; thirdly, the arrangement of oblique teeth on the face of the sheller, for giving the ears a forward progressive movement, whilst another set of teeth give them a rotary motion, and shell the cob, in combination with the (usual) teeth, as set forth."

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33. For a method of *Transporting Bales of Cotton;* Geo. R. Griffith, Mobile, Alabama, September 25.

The patentee says,—"The first part of my invention consists in securing each bale of cotton, against the introduction of water, by means of a case, or envelope, of India rubber, or other water proof cloth, which shall contain the bale, covering its bottom and its sides, and, when required on account of rain, covering it at top also.—Around the upper edges of these cases, or envelopes, I affix rings, or loops, in such manner, and so situated as shall enable me to attach the respective cases to a bale of cotton, by means of cords, or strings."

"The second part of my invention consists in the manner in which I combine any desired number of such bales together, so as to form them into a raft, the extent of which will be limited only by its capacity of being managed with convenience, but which may be as extensive as the rafts of timber which descend the same rivers; whilst they may be navigated at periods when timber rafts cannot, as such bales will not usually have a draught of more than eight, or nine, inches, and the raft which they compose will, from its flexibility, yield in shoal places, where rafts of timber would be arrested."

Claim.—"What I claim as my invention, is the forming, or constructing, of rafts of bales of cotton, by combining said bales together in the manner set forth; that is to say, by first providing each separate bale with a case, or envelope, of water proof cloth, made and attached thereto in the manner described, and attaching said bales to each other, so as to form a narrow raft, consisting of pairs of bales, by ropes running along the whole line, and by other ropes crossing from bale to bale, as herein described; and the uniting of these rafts of pairs laterally, by means of ropes between the separate pairs of bales to any required extent. And I do hereby declare that I do not intend to confine myself to the precise manner of attachment herein made known, but to vary this as I may think proper, whilst I attain the same end by means substantially the same."

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34. For an improvement in the *Bee-Hive;* Hiram A. Pitts, Winthrope, Kennebec county, Maine, September 25.

The improvement for which this patent is granted, is so distinctly pointed out in the claim, that we deem it unnecessary to add any explanatory remarks.

Claim.—"What I claim as new, is the manner set forth of constructing the bottom, or protector; the upper floor upon which the bees are to enter consisting of frames with wire gauze stretched across them, and there being below this a second, and, if desired, a third, floor, having spaces between them for the entrance of the bee moth, so prepared and furnished, in the manner described, as to induce the moth to deposite its eggs therein, and so arranged and connected with the hive as to be readily removed and replaced substantially as made known."

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35. For improvements in *Hot-Air Furnaces* for warming buildings, &c.; John A. Page, Boston, Mass., September 25.

Claim.—"I shall claim the sliding button applied on the crank shaft, in combination with the projections above the button, the same being for the objects and purposes fully specified. Also the mode of constructing the base sustaining the fire pot of the furnace, by making it in separate parts supported on temporary walls, or contrivances of a like character, built inside of the main walls of the ash pit, by means of which arrangement the fire pot, or either of the plates, can be easily removed at any time, and others substituted without disturbing the radiator, or materially disarranging any of the adjacent parts. I also claim the manner in which I have arranged the air tubes of the radiator over the furnace, by placing their lower extremities around the edges of the fire pot, and inclining them so that they shall converge towards each other at their upper ends, or where they enter the top plate of the radiator; also combining said pipes, so arranged, with an exterior hollow conical frustrum shaped casing, surrounding the same, by which mode of arranging the air tubes and casing, the fire is enabled to act more equally over their surfaces, than in the arrangements now existing, in which said tubes are placed perpendicularly

over the furnace, and inclosed by a hollow cylinder, the whole being substantially as described. I also claim the partition with its sliding valve and opening combined with the radiator, and arranged in the rear of the same in front of the entrance of the smoke pipe, and extending upwards to within a short distance from the top of the radiator, its object being the retention of heat, all as described. I also claim the method herein above explained of constructing the lower, or bottom, plate of the radiator, with a movable plate confined thereto by screws and nuts, by which arrangement a fire pot of a different diameter can be easily substituted, in the place of the one removed, by changing the movable plate for another having a circular aperture adapted to said fire pot."

The button mentioned in the first section of the claim, is for the purpose of facilitating the turning of the grate. The lower part of the fire pot is provided with boxes for the reception of the gudgeons of the turning grate; and when a grate is introduced it is passed in from the top of the pot, and one gudgeon passed into its box, which is elongated vertically for that purpose, and the squared end of this gudgeon fits into a socket in a shaft that extends to the outside of the furnace, where it is provided with a crank handle, with which to turn the grate to shake out, or discharge, the cinders; and to prevent the grate from turning, when not required, there is a sliding button, or plate of metal, on the end of the shaft, (which is squared for this purpose,) the upper edge of which lies under two projections from the side plate, or wall, of the furnace, and, whilst thus located, the grate cannot be turned, but when drawn out beyond these projections the grate can be turned with facility.

The other portions of the claim need no explanatory remarks.

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36. For an improvement in the machine for *Separating Garlic from Wheat;* Joseph Heygel, Salisbury, Somerset county, Pennsylvania, September 25.

The nature of this invention consists in providing a series of concaves arranged on an inclined plane, with oblique plates, on which teeth, in the form of those of a rasp, are cut; in each of these concaves rotates a winged wheel provided with metallic plates having teeth cut inversely to those on the first named plates. These wings propel the wheat and garlic with great velocity against the oblique plates, the teeth of which pierce and break the garlic into small particles, which, then being much smaller and lighter than the grains of wheat, are readily separated therefrom by a sieve and fan.

We are under the necessity of omitting the claim, as it refers and depends so much on the drawings that, without them, it could not be understood; it is, however, limited to the devices above indicated, in their combination and arrangement.

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37. For improvements in the machine for *pressing and finishing Bricks and Tiles;* Joseph B. Wilson, of Malden, and Alfred B. Crossman, of Huntingdon, Mass., September 30.

Claim.—"We claim constructing the mould (independent of the followers) of separate pieces, or plates, of chilled cast-iron, hardened steel, or other suitable material, fitted to each other by shoulders, as described, and arranged in a frame, and secured together by screws passing through the sides of the frame, the same being arranged and confined together by screw bolts, as explained, the whole being for the purpose of contracting the mould in its length, or width, and thus obviating, at any time, whenever necessary, and in any manner set forth, the difficulties resulting from the wear of the inner surface of the mould. We also claim interposing a piece of cloth, felting, or other suitable material of like character, between the plates composing the back follower, the cloth being, from time to time, saturated with any unctions, or fatty matter, the whole being for the purpose of lubricating the interior of the mould, as set forth. We also claim the machinery for producing the impression, and removing the brick from the mould, the same consisting of the eccentrics with their cams, or wipers, constructed, arranged, and operating together substantially in the manner explained."

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38. For a machine for *Planing Timber of various kinds;* Henry Law, Wilmington, New Hanover county, North Carolina, September 30.

"The board to be planed is to be dropped into a trough, or space, prepared to receive it edgewise, one end of said board projecting out beyond the end of said trough towards the plane stocks. The end at which the stuff is fed is called the fore end of the machine. The plane stocks are made to slide back and forth horizontally between suitable guides, a reciprocating motion being given to them by means of a shackle bar, or connecting rod, vibrated by a crank, and attached at one end to the plane stock apparatus. The shaft of the crank is placed horizontally, and has a fly wheel upon it, to regulate its motion; and this shaft may be driven by any adequate power. The crank may, in a machine of ordinary size, have a throw of seven inches, giving a vibration of fourteen inches to the plane stocks. As these stocks vibrate they approach the projecting end of the board contained in the trough, and said board passes in between them, and is seized and held by two iron gripes, which draw it onward towards the rear end of the machine, as the plane stocks recede from, but let go their hold as they advance towards the trough. When the board has been drawn to a suitable distance out of the trough, by the receding of the plane stocks, there is forced in at its fore end a bar of wood, or of metal, which serves as an abutment to prevent its return when it is being acted upon by the plane irons. There is a series of such bars, or abutments, crossing the trough from side to side, at a distance of about a foot from each other, when the vibration of the plane stocks is about thirteen, or fourteen, inches; the falling in of a fresh abutment at every stroke of the planes will be thus insured, and in this way twelve inches of the board will be planed at every vibration of the plane stocks."

A series of planes consisting of four, or more, are arranged on each side for planing the surfaces of the board, and a series above and below for the edges, and for tongueing and grooving.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the manner herein set forth of planing boards, plank, or other timber, by means of reciprocating, or vibrating, plane stocks, operating upon stuff held by the iron gripes, and which stocks are to be moved back and forth to a short distance, say to that of a foot, more or less, and are to operate upon a corresponding length of the board, or other timber, to be planed, by means of a plane stock apparatus like that herein described. And I also claim, in combination with such reciprocating plane stocks, the manner of feeding the stuff to the planes, and of sustaining it against their action, by the combined operation of the gripes, which are to seize and to draw the stuff back with the backward motion of the plane stock, and of the sliding bars, or abutments, which are made successively to pass in at the fore end of the stuff, and sustain it against the action of the cutting, or plane, irons. And I do hereby declare that I do not intend, by the description given of the manner of forming and arranging the auxiliary parts of the apparatus, to limit, or confine, myself to the precise form of these parts, but to vary them as I may find expedient, whilst the general construction and operation of the machine remain substantially the same with that herein set forth; and whilst it is made to retain those features by which it is distinguished from all other machines which have hitherto been constructed for the same purpose."

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39. For a machine for making *Wire Heddles, or Weavers' Harness;* Abraham Howe, and Sidney S. Grannis, Morrisville, Madison county, New York, September 30.

Claim.—"What we claim as new, and desire to secure by letters patent, is the manner in which we have combined and arranged the shafts P and Q, and their respective stands, with the arm N, and its stud, the latter being made to revolve with the pinion M, the shafts and arm being made adjustable by an arrangement of parts substantially the same with that described. We also claim the mounting of the above claimed apparatus, upon a wheel revolving horizontally, the same being actuated substantially in the manner, and used for the purpose made known."

When a heddle is to be formed the wire is turned around a vertical pin towards the back end of the shaft Q, carried from thence around a similar pin toward the back end of the shaft P, and then back again to and around the first mentioned pin—this forms the two end loops, and the wires thus disposed embrace three studs, one on the inner end of each shaft P and Q, and the third on the end of the arm N, and standing midway between the other two. The arm N, projects from a hollow shaft provided with appropriate gearing by which it is turned, and through it passes the shaft P, so that they can turn independent of each other. From this arrangement it is evident

that by turning the arm N, with its stud, which is midway between the other two, the two wires are twisted between each of the three studs, and a loop formed. All the parts are adjustable by means of slots and set screws, and the whole is mounted on a horizontal cog wheel, actuated by a crank handle and pinion, by which the operator can bring either end of the machine towards him, and coil the ends of the wire around the end pins.

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40. For an improvement in the *Plough;* Joseph and Henry F. Cromwell, Cynthiana, Harrison county, Kentucky, September 30.

We refer the reader to the following claim, which fully explains the character of the improvement for which the patent is granted:—

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the method of combining the mould board, point, and land side, or bar, of the plough, as herein set forth, viz., by constructing the land side and point in one piece detached from the mould board, and attaching the latter to it by means of a groove in the point and ears, riveted on the land side, through which bolts are passed, so as to secure the whole."

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41. For a machine for *sticking Pins in papers;* Samuel Slocum, Poughkeepsie, Dutchess county, New York, September 30.

The pins are placed in a hopper with the heads all in one direction, and delivered into a series of grooves on the surface of a plate, by running the hopper over it from end to end. The grooves in this plate are large enough to receive and allow the heads of the pins to slide in them, except for a short distance along that edge of the plate which is towards the paper into which the pins are to be stuck, where they are reduced to the size of the shank of the pins; this not only guides the point of the pins whilst passing into the paper, but answers as a gauge to arrest them when pushed into the paper sufficiently far, which is effected by means of wires projecting from a sliding plate, or follower, like a comb, and which slide in the grooves.

Claim.—"What I claim as my invention, and wish to secure by letters patent, is first, the plate with the grooves for receiving the pins; second, the sliding hopper which deposits the pins in the grooves, as described; third, the sliding plate, or follower, with the wires attached thereto, in combination with the groove plate, as described, and also these in combination with the hopper, as described."

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42. For improvements in *Locks for doors, safes, &c.;* Solomon Andrews, Perth Amboy, Middlesex county, N. Jersey, September 30.

The patentee says,—"My improvements consist in combining with the horizontal tumblers upon which the bits of the key have heretofore been made to operate, a corresponding number of upright, or vertical, sliding tumblers, which are to be lifted by the key, and which bear against and lift the horizontal tumblers; and also in giving to the said upright, or vertical, tumblers a peculiar form, which I

denominate the double belly, by which peculiarity in their form the key is made to act upon said upright tumblers, and through them upon the horizontal tumblers, in a manner which renders the operation of the lock much more certain and accurate than without such provision."

The double belly, referred to above, requires to be pointed out more clearly to enable the reader to obtain a clear idea of this peculiarity. The lower edge of the horizontal tumblers which turn on a pin projecting from the bolt, so that they travel with it, is so formed as to coincide with the upper edge of the vertical, or lifting, tumblers, when the latter are either up, or down, and, therefore, one portion of the lower edge must make an obtuse angle with the other equal to the amount of the angle of the lift; this is called the double belly, and it is necessary to insure the retention of the horizontal tumblers at the same elevation during their motion back and forth with the bolt.

We are under the necessity of omitting the claim, as it refers to and is dependent upon the drawings, but it is confined to the two improvements above explained.

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42. For an improvement in the machine for *Rolling Dough and Cutting Crackers;* Riley Darling, East Greenwich, Kent county, Rhode Island, September 30.

This patent is granted for a mode of combining a machine for rolling the dough, by means of rollers and an endless apron, with a machine for cutting the crackers, by means of a double crank, the first of which is connected with and operates the cutter frame by means of a connecting rod and pendulous lever on the end of a rock shaft provided with arms that lift and force down the cutters on to the dough; and the second with the ratchet wheel of the rolling part by means of hands, or palls, to give an intermitting motion to the dough corresponding with the motion of the cutters.

Claim.—"What I claim as my invention, is the manner described of combining the operation of the two by means of the double crank, in combination with the connecting rod and pendulous lever attached to the cutting parts, and the hands and ratchet wheel attached to the rolling parts."

The machine for rolling the dough, and the machine for cutting crackers are separately disclaimed, as well as their combination, except in the manner specified.

MECHANICS, PHYSICS, AND CHEMISTRY.

Extracts from the Report of the Committee on Naval Affairs, to whom were referred certain communications from the War and Navy Departments on the subject of large wrought-iron guns, and in pursuance of the duty assigned them by the House of Representatives, submit the following Report:

ORDNANCE OFFICE, *Washington, April* 5, 1844.

Sir,—In reply to the resolution of the House of Representatives,

calling for information as to what experiments have been made by officers of the War Department, for the purpose of testing the strength and utility of cannon manufactured from wrought-iron; specifying such particulars as may tend to show the relative strength and utility of wrought and cast-iron cannon, together with copies of all reports from ordnance, or other, officers on this subject, and such other information connected therewith as may be considered useful; as also the experience of European powers on this subject, and particularly the largest size to which wrought-iron cannon for solid shot have been carried with success; and likewise the expenses of the experiments, and to whom the money was paid,—I have the honor to report:

That the only experiments for the purpose of testing wrought-iron guns, recorded as having been made by this department, are the trial of two six-pounder guns at Washington and Watervleit Arsenals in 1832, and the experiments now in progress, but not completed, at Fort Monroe Arsenal, with some guns of the same calibre.

In the experiment at Watervleit Arsenal, the gun was fired twice with a proof charge, and forty times with service charges.

The band which held the trunnions slipped off at the eighteenth fire, and the firing had to be stopped to replace it. After firing the forty two rounds, the gun remained serviceable, but the enlargement of the bore was found to be as much as .04 inch, which is more than double that of the bronze guns now made. This enlargement of the bore is the greatest objection to bronze artillery, and would soon render a gun unserviceable; and, so far as this experiment goes, it tends to prove that wrought-iron has no advantage over bronze in this respect, and, consequently, no greater durability. The particulars of this experiment, and of the mode of manufacture pursued in this instance, will be found in the report of Major Talcott, and the accompanying statement of the manufacturer, copies of which are inclosed herewith.

The trial at Washington Arsenal consisted only in firing proof charges, which left the bore of the piece in a condition unfit for service, by opening the seams, or welds.

By direction of the Secretary of War, some six pounder guns have been manfactured in 1843, according to a new method, which is not divulged, at the same price as bronze guns, and promising to unite the advantages of wrought with those of cast-iron. These guns are now at Fort Monroe Arsenal, where experiments to test their strength and durability are in progress. They are not, however, completed; and although, of those tried, one failed at the one hundred and fiftieth fire, by the trunnion band becoming loose, and another at the four hundred and fiftieth fire, by the opening of the welds, the results, so far, are not sufficient to warrant a definite conclusion as to the merits of this mode of fabrication.

So far as it has been tested by this department, wrought-iron has not proved a good material for the manufacture of field guns; and as the difficulty of fabrication increases with a greater quantity of metal, it is less suitable for those of larger calibre. The greatest objection, and, apparently, an insurmountable one, is the difficulty of welding

the parts together perfectly, and the still greater difficulty, or impossibility, of ascertaining whether the welds are perfect, or not. Besides, the effect of heating is to render the iron more porous, and of less specific gravity and tenacity; and, when often repeated, is known to destroy the good qualities of the best refined iron. When the bars are of small size, as in gun barrels, the hammering compresses and reunites the particles, and corrects these defects; but in large masses the effects of the hammer do not reach the interior of the mass, which is, consequently, left open and spongy, although the metal on the surface, and to a slight depth, is compact and fibrous.

The objects attempted to be gained by the use of wrought-iron for cannon, are 1st, lightness; and 2nd, strength.

1st. Reasoning from the successful use of that material for small arms, it has been supposed that a careful and skilful fabrication would effect these results. But lightness, below a certain ratio, is *not* desirable, it is positively injurious—for light guns can be used only with light charges. Field guns cannot be conveniently served when they have less than one hundred and fifty pounds of metal to each pound of shot, and battering guns require at least two hundred pounds of metal to each pound of the shot. With any less weight, the service of the gun is very difficult, from its excessive recoil; therefore, lightness is not a desirable point in the construction of cannon.

2nd. Strength. As this is always desirable, it should be effected, if possible, but not at the expense of any other important point. If it were possible to fabricate sound and strong guns of wrought-iron, they would be found deficient in hardness. The projectiles used are of cast-iron, a material much harder than wrought-iron; consequently, the wrought-iron gun is soon indented and worn so much as to prevent all accuracy in firing, and it then is worth little, or nothing.

Leaden balls are used in small arms; but they are inadmissible in cannon, as the great heat of the exploded gunpowder melts the lead more, or less, and changes the form of the ball, thereby reducing its range; besides, lead has not sufficient tenacity to enter hard substances, and, therefore, is not a suitable material to be used against ships and batteries. Wrought-iron is also more liable to injury from rust, than bronze, or cast-iron; and the smallest crack admitting moisture, would, of itself, in time, seriously injure the gun. The first cost of wrought-iron cannon is the same as that of bronze, and more than six times that of cast-iron. Bronze guns, it may be further remarked, after being too much worn for service, can be easily recast, whereas the old wrought-iron is useless for refabrication, and of little value in such large masses for any purpose.

In regard to the experience of European powers on this subject, it may be stated, generally, that the use of wrought-iron as a material for cannon, has been attempted in Europe repeatedly, without success, from the invention of fire arms to this time. The cannon of small size have succeeded better than larger ones; indeed, there is no known record of a wrought-iron gun for heavy shot proving satisfactory. The works of European writers on artillery abound in notices of

wrought-iron cannon, of dates of manufacture extending back from the present century to the remotest periods of their use.

Frequent instances of accidents from their bursting are mentioned, and they have never been successfully manufactured on a large scale. Meyer, in his work entitled "Experiments in the Fabrication and Durability of Cannon, both Iron and Bronze," edition of 1834, says: "It is certain no experiment in artillery has been as often unsuccessfully repeated and abandoned as the fabrication of wrought-iron cannon; and even at this time we are but little further advanced in it than at the beginning;" and Gassendi, in his "Aide Mémoire d' Artillérie," edition of 1819, condemns the use of wrought-iron for the manufacture of cannon entirely.

Herewith are submitted extracts from different writers, containing a chronological history of wrought-iron cannon, and remarks on the use of this material for their fabrication.

In regard to "the relative strength and utility of wrought and cast-iron cannon," the former having been already noticed, it may be stated in reference to the latter—

1st. As to the strength. Cast-iron is of so many different qualities and kinds, and so variously affected by different modes of fabrication, that it is impossible to speak of the strength of cast-iron guns *generally*. It is known, however, that, by careful attention to the selection of the metal, to its treatment in the furnace, to its proper distribution throughout the body of the gun in relation to the force exerted on its different parts by the discharge, to its gradual cooling after being run into the moulds,—in a word, to all the manipulations connected with its manufacture; and by a judicious, moderate proof, serving to detect any flaws, or imperfections, which may have escaped observation during the manufacture, and not so severe as to strain, or weaken, the cohesion of the particles, cast-iron guns, sufficiently light for siege, seacoast, and garrison service, may be made, the use of which, with full charges, will be safe for at least 1000 fires. But although the practicability of making good and safe guns of cast-iron is believed to be an established point, it must be admitted that it requires a constant supervision and vigilance, which can only be obtained by means of a foundry under the entire control of the government, or the employment of a skilful practical officer to attend at the private foundries during the whole process of fabrication.

2nd. As to utility. In former times it was supposed that bronze only was suited for heavy guns, both on sea and land: and it was only after great advances had been made in the arts, that the maritime powers of Europe ventured to use cast-iron guns on board their ships. The less cost and greater hardness of cast-iron, therefore, have led to its use for artillery; and when it is considered that six or seven cannon of this material can be procured for the same cost as one of bronze, or wrought-iron, it will readily be perceived that, if we can fabricate them in such a manner as to render them safe for only one thousand fires, they should be adopted on the score of economy, and their accuracy of fire up to the period of their being laid aside; accordingly, all the European powers have fabricated their heavy guns,

for ships and batteries, of this material—using bronze only for field and siege trains.

The British troops, in the Peninsula war, on several occasions found their siege trains of bronze speedily rendered unserviceable, and resorted to cast-iron guns; the superiority of which, over bronze, consisted in their greater accuracy, and being less heated in rapid firing; and they are stated to have endured two thousand seven hundred discharges. "These pieces had preserved such accuracy of fire, that in the last days of the sieges they were fired from a great distance over the heads of the besiegers at the breach, with sufficient precision to reach the besieged behind a high rampart."

The expenses of the experiments in wrought-iron cannon made at Watervliet and Washington Arsenals, consist only of the cost of the ammunition used in firing them, which was taken from that on hand at those arsenals. Nothing was paid for the guns. For the experiments now in progress at Fort Monroe Arsenal, the expenses consist of the cost of the necessary ammunition prepared at the arsenal, and the price of the guns, ($2100,) which has been paid to the manufacturer, Mr. Daniel Treadwell, of Massachusetts.

The resolution of the House of Representatives is herewith returned.

I am, sir, very respectfully, your obedient servant,

G. Talcott, *Lieut. Col. Ordn.*

Hon. William Wilkins, Secretary of War.

Watervliet Arsenal, May 24, 1832.

Sir,—Mr. Reuben Hunt, of Canaan, Litchfield county, Connecticut, has brought to this post a wrought-iron six-pounder cannon, a drawing of which is inclosed herewith, together with a description of the mode of manufacturing the same. As it appeared by your letters of 22d August, and 7th November last, which have been shown to me, that you were desirous of having this work tested and proved, and he not having the means of fully proving the gun, I have deemed it an object of sufficient importance to the government to warrant my proceeding to prove and try it, without specific orders upon the subject.

The gun appears to be sound in the bore; some small flaws in the welding are perceptible, but no cavities of sufficient depth to injure it materially. It is not very smoothly bored, nor is it of the proper calibre; all which errors are believed to be within the reach of correction when the manufacture is undertaken on a proper scale, and with suitable tools. The exterior appears perfectly sound and smooth.

It was proved twice with four pounds of powder, (old powder, the best we have,) giving a range of about 250 yards, with the new eprouvette, two shots, and two wads, and was then fired forty rounds with one and a half pound of powder, one shot, and one wad. At the eighteenth round, the gun slipped out of its trunnions, and it was then discovered that the band, into which the trunnions were welded, was put on very imperfectly, hardly touching the body of the gun, except at its upper and lower edges. A new band was made, and put on

carefully, after which the other twenty-two rounds were fired, without effecting any perceptible change; and it is believed that the gun, in its present condition, would stand service. Annexed to the drawing is a statement of the diameter of the bore before proof, and also its condition after all the firing was finished, by which it appears that a small increase, or expansion, has taken place. The iron seems to be of good quality, tolerably hard for forged iron, and the inequalities of the shot have made very little impressions upon the bore—nothing like the effects that would be produced upon a brass gun subjected to the same trial.

The gun remains here, subject to your orders. The expense of removing the band and trunnions, including labor, coals, and iron, was $21.22, which amount will be chargeable to Mr. Hunt, unless you should authorize the expenditure.

Very respectfully, I am, sir, your obedient servant,

GEO. TALCOTT, *Bt. Major, &c.*

Col. G. Bomford, Ordnance Office, Washington.

From Meyer's Historical Manual of the Technology of Fire Arms, from their invention to the present time. Paris edition of 1837.

According to Vassius, the Chinese had, in the year 1055, cannon of bronze and wrought-iron, which were worked with much skill.

A wrought-iron cannon was found in the ruins of the castle *Uf Huger* on the Rhine, which castle was destroyed in the year 1308.

In the year 1338, the Teutonic order had three bombards of wrought iron.

At the siege of Eu, in 1340, the English had large wrought-iron pieces, with which they threw round stones.

According to Villani, the English, in 1345, had wrought-iron cannon before Monségur. Darriel says that there are indications of the existence of wrought-iron cannon and of powder at Toulouse at this time.

Siege of Claudia Fossa by the Venitians in 1366. Ligurius, speaking of this siege, says that some Germans came with two small wrought-iron pieces, firing leaden balls, which they offered to the Venitians, and that they used them with great advantage.

Description of the bombard by Redusius in 1427. It is of wrought-iron, and is composed of a straight bore behind, which widens like a funnel towards the mouth; the forward, or funnel shaped, part is eight calibres long, the rear part sixteen. In the straight part of the bore is placed an artificial mixture of saltpetre, of sulphur, and charcoal; the entrance is closed with a wooden tompion, on which, in the widened part of the bore, the stone bullet rests. This mixture is fired by means of a small aperture behind.

1439. Facius says that bombards are made either of wrought-iron, or copper; the two tubes, of which they are composed, being either run together, or joined to each other, on the same stock.

In 1452, there was used before Oudenarde a wrought-iron cannon made of bars. It had a chamber containing one hundred and forty

pounds of powder; its calibre was twenty-two inches; its circumference ten feet ten inches; its weight thirty-three thousand pounds; it threw stone bullets, or small casks filled with broken glass, scraps of iron, &c. It was called *Margot la Folle.*

In 1494, Charles VIII suppressed entirely wrought-iron bombards, and had no other artillery than that of bronze.

In 1544, mention is made of a wrought-iron piece used in the defence of St. Dizier; it weighed six thousand eight hundred and thirty-one pounds; was eight feet two inches long, and it projected eight cubic feet of stone at once.

There is at the museum of Paris a wrought-iron piece of 1555, very long, but of small calibre, with a movable breech.

In 1833, there were at Strasbourg several wrought-iron cannon bearing the date of 1602; some of which were made to load at the breech.

1621. The cannon called *abraga*, are loaded by means of separate chambers. These pieces are usually of wrought-iron, and of calibres as high as one hundred pounds. Sarti saw some at Gand, and at Amsterdam—one of which weighed 33,000 pounds—where they were used principally on board of vessels. Venice has many pieces (fifty pounders) of this kind on board of her galleys, where they are mounted on carriages. The chambers are of wrought-iron, or bronze, three for each piece. They are fixed in behind by means of wooden wedges; at the moment of firing, those serving the gun stand on the sides.

In 1660, there was cast in India a large bronze cannon, with a wrought-iron bore of six inches diameter, weighing seven thousand seven hundred and twenty-six pounds.

1661. There is at Berlin a wrought-iron piece of this year, for a two ounce ball, rifled with thirteen grooves, with a screw breech, and a sight turning on a hinge.

There is now at Woolwich (1830) a wrought-iron piece, made at Nuremberg in 1694. There was at Zurich, in 1694, an old wrought-iron cannon composed of many pieces, easily separated from each other.

In 1697, there were made some wrought-iron pieces, composed of bars wrapped round a core. An eighteen-pounder of this kind burst at the first fire.

The wrought-iron cannon made at Ocona, in 1744, stand well the proofs to which they are subjected. These cannon are now (1832) in the museum of Paris. They are of calibres of three and a third and two and a half inches; five feet one inch long. One of them weighs two hundred and ten pounds.

1747. Senner fabricates cannon of wrought-iron, the bores of which are grooved, and the bottom of the bore movable.

1753. There is at the arsenal of Paris a handsome wrought-iron twelve pounder, manufacture of Gentin, weighing one thousand six hundred pounds. It was made solid, and bored out.

1764. There are at the arsenal of Paris three wrought-iron cannon—one twelve and two eight pounders. These pieces, made on

spindles, or cores, are composed of longitudinal bars covered with bands; the whole welded together.

1765. Anciola caused to be made at Pagaloga, in Spain, three wrought-iron pieces—one four-pounder long, one four-pounder short, and one eight-pounder. Bars of iron were used of one and a half inch in thickness. These pieces forged solid, and afterwards bored and turned, sustained, without injury, the proof firing, with charges of the whole weight, and two-thirds the weight of the ball. A royal order directed the fabrication in the same manner of two twenty-four pounder cannon, (weight twenty quintal—4,400 pounds English,) two sixteen-pounders, (nineteen quintals—4,180 pounds English,) and two twelve-pounders, (sixteen quintals—3,520 pounds English.) Some of these pieces were cracked in the proof. In one of these a new breech was put, and it stood proof. They were forged by hand.

There is at Paris (1830) a very handsome wrought-iron mortar, six and a half inches bore, weighing two hundred and twenty pounds, and made in 1775, at Madrid, by Ortega. The collection at Woolwich contains a German wrought-iron piece of 1775.

Norbec saw at St. Sebastian, in 1780, wrought-iron cannon proved at that place in 1765, and which had remained since that time under an open shed. They were, he says, but little affected by rust.

1782. In France much interest is taken in wrought-iron pieces. Langevin has made two four-pounders to the order of Marshal de Castries; and Bradelle, of Bordeaux, has made many for the owners of privateers, at the rate of twenty-five sous per pound.

1796. In France bronze artillery proves again to be of little durability. La Martilliere supposes that at the peace there will not be less than one thousand four hundred and ten of these cannon to recast, being completely unserviceable. He proposes to make, of wrought-iron, small chambered pieces, such as are used at sea, to load at the breech.

1804. They manufacture in France wrought-iron pieces.

1810. The French find in Spain wrought-iron pieces, which the people of the country say had been used in the wars against the Moors.

1812. Fabrication of a wrought-iron three pounder at Gleiwitz.

1813. In France the company St. Etienne offers to deliver daily eight twenty-four-pounders of wrought-iron. An eight-pounder presented for trial sustains four fires with three pounds of powder, and five fires with four pounds. This piece appears to have been composed of bars wound round an iron tube, and joined with silver solder, and a screw breech. The cost of fabrication was not to exceed that of recasting bronze pieces.

1820. Professor Persy, in his "Notions on the Forms of Cannon," proposed to forge iron pieces on a core.

1828. Horton takes out a patent for wrought-iron cannon. The wrought-iron cannon made at Gleiwitz, in 1812, is proved. It becomes much heated, and cracks; but sustains, notwithstanding, a great number of charges with ball, and a charge of powder half the weight of the ball.

1830. A cannon made of bar-iron wrapped spirally, and soldered with copper, does not sustain the proof fire.

From "Experiments on the Fabrication and Durability of Cannon, both Iron and Bronze," collected and arranged by Moritz Meyer; Paris edition of 1834.

It is certain that no experiment in artillery has been as often unsuccessfully repeated and abandoned, as the fabrication of wrought-iron cannon; and even at this time we are but little farther advanced in it than at the beginning. It is known that the cannon which were called bombards, were composed of bars of iron, held by circles, like the staves of a cask; shortly after, they were brazed together. At this time their chief use was to fire against cities; and as there was, consequently, little need of accuracy of fire, and the powder was weak, and the projectiles of stone, these clumsy and badly made machines were sufficient; they did, however, frequently burst; as, for example, at the siege of Constantinople, by the Turks, where a bombard firing stone projectiles of four hundred and eighty kilogrammes (1056 pounds English,) weight, burst at the first fire, and killed many persons. James II, King of Scotland, was killed at the siege of Roxburgh, in 1460, by the bursting of a bombard. Ancient writers, such as Miethen, Sardi, &c., relate that wrought-iron cannon frequently burst in rapid firing.

Subsequently, cannon seem to have become more defective, as the artillery corps became better instructed. Guns of large calibre were abandoned, which facilitated the fabrication; but, at the same time, greater exactness was required, and cast-iron balls were introduced; a greater number of pieces were used, and the firing was more rapid; whence the fabrication, already defective and difficult, became more so. It was then increased by the introduction of trunnions. But, in consequence of the great uncertainty of the results of the different welding heats, which often burnt the metal in some of its parts, the fabrication of wrought-iron cannon was abandoned in the middle of the fifteenth century, for the introduction of cast-iron. Nevertheless, reckoning on the progress which had been made in the art of metallurgy, it was resumed in later times, with the hope of overcoming the difficulties which had formerly been regarded as insurmountable. Thus, in the sixteenth and seventeenth centuries new experiments were undertaken, but after a new method. Massive cannon were forged by means of *skelps* suitably prepared. The archives of the arsenal of Paris mention a twelve-pounder wrought-iron cannon, weighing sixteen hundred pounds, made in this way in 1753. There are to be seen at the museum of the artillery school of Strasbourg, four wrought-iron pieces, weighing from ninety to one hundred pounds; one of which bears the date 1601.

At the commencement of the last century, new attempts were made in France to introduce the manufacture of wrought-iron cannon by a new process. It was proposed to envelope them with solid bands. A very high price was asked for cannon made in this way, under the

pretence that they must offer great advantages, because the direction of the fibre of the iron was perpendicular to the axis of the gun, where the greatest strain from the ignited powder was exercised.

St. Remi, in his Memoirs, mentions the process followed on this occasion; but he adds, that, notwithstanding the assurances of one of the manufacturers on the excellent quality of an eighteen-pounder, which he presented, it *burst at the first fire into two pieces, and killed and threw into the Seine many persons.* He also mentions a wrought-iron cannon composed of seven pieces, which offered the advantage of easy transportation; but he adds, that it burst into small pieces at the proof. In 1745, several wrought-iron eight and four pounder cannon were tried at Toulon. They resisted charges of six and four pounds of powder. After several discharges, one of them (an eight-pounder) began to crack; but, notwithstanding, it still stood many fires, and it was not broken in pieces but with much trouble, and after using powerful means.

In the present century, though not far advanced, much ingenuity has been exercised on this unfruitful subject. But although more light has been thrown on it than in the preceding century, we have not yet succeeded in satisfying the requirements of artillery.

The experiment which has succeeded best, took place in France in 1813. The company *Etienne* offered to the government a wrought-iron eight-pounder, weighing eight hundred pounds, which, according to Gen. Gassendi, (page 784, 5th edition,) had the bore forged in the same manner as a musket barrel, (similar ones had already been proposed before;) the bore was closed by a screw breech. This cannon sustained four fires with eight pounds of powder, and three with five pounds. This company engaged to deliver twenty-four pounders, which should not cost more than bronze guns of the same calibre. In Silesia they have forged many cannon of a single piece, but which have not given satisfactory results. We have seen two cannon which were wrought in a German shop, and which were formed of twisted bands of iron, but they broke to pieces in the proof. At the Carron works, in Scotland, experiments have lately been made on pieces composed of iron bands, and an Englishman has taken out a patent for it, but the results are not known abroad.

* * * * *

An objection to wrought-iron guns, which appears much more serious than liability to rust, arises from the great difficulty experienced in their fabrication on a large scale, which permits the doubt whether it can ever furnish a supply sufficient for all wants. When we consider the difficulty experienced in finding plates for musket barrels free from defects, even when they have been prepared with care—and even after that, how many of these barrels are filled with flaws and cracks; when we know how difficult it is to weld together pieces of large dimensions, without leaving some places of imperfect junction, which may afterwards permit the rust, or the fire, to penetrate; how difficult it is to discover this defect by proof, or otherwise; and, finally, how negligent the workmen, and how inattentive even the overseers in the shops are,—it must be admitted that a wrought-

iron gun, which ought to undergo the most rigorous proof, would not, even if it should therein prove perfectly satisfactory, afford all the necessary guarantees; and the success of no one would warrant the adoption of their manufacture on a large scale.

* * * * * *

Wrought-iron (as a material for cannon) fulfilling the requisite condition of tenacity, has naturally attracted attention. The difficulty of fabrication has not stopped some manufacturers. It seems, indeed, that this obstacle is susceptible of being overcome; and that it has been, as is proved by the wrought-iron guns which exist at present, and some of which date back to very remote periods. Besides, working in iron has, in late times, made great progress; and there is reason to believe that if a reward and a large order were secured to him who might present a wrought-iron cannon of sufficient strength, a manufacturer, at reasonable prices, would quickly be found. But the condition of resistance to the explosion of powder is not the only one to be fulfilled. It is also requisite that the bore of the guns should resist the pressure and the balloting of the balls. For many experiments prove that lodgments of the balls are often formed in the bores of wrought-iron guns so quickly as to leave doubts as to the great advantages which many authors have attributed to this kind of cannon.

From Gassendi's Aide Mémoire: Paris edition 1819.

But these wrought-iron pieces, and others like them—are they good? ought they to be adopted? No. Because,

1st. They soon destroy the carriage by the suddenness and length of the recoils.

2nd. Because of the serious inconvenience to those serving the pieces from the length of the recoil.

3rd. On account of the alteration in the ranges by the continual and inevitable oxidation of the bore.

4th. The moral effect on the gunners, from the fear of their bursting.

In fact, these pieces often burst, although the first which are presented by the inventors for proof do not always do so, because they use for them selected metal, and carefully watch their fabrication: but, in making a number, is it to be hoped that the metals will be as scrupulously selected, and that an observing and practiced eye will watch over the degree of heat which the metal ought to have in order to work solidly the immense number of welds necessary to finish the piece; then, from firing, the imperfect welds will be imperceptibly opened; moisture will penetrate the fissures, which, increasing to a certain extent, will cause the gun to burst; exfoliations will be formed in the bore, which will retain fire and cause accidents. Finally, the irremediable oxidation of the bore in time of war will so enlarge it, as to render the guns unserviceable, and, in time of peace, there will be the trouble of keeping them constantly painted to prevent this oxidation. We have been thus profuse on the defects of these pieces,

to answer, once for all, an innovation which appeared good, and which is often represented as something new.

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Mr. Rhodes, a very skillful and practical naval constructor, who was employed for some time by the Turkish government, states that there are in the arsenal at Constantinople many wrought-iron cannon of calibres varying from one hundred pounders to the smallest sizes. These guns have all been thrown aside, and are no longer considered as suitable for service. By direction of the Sultan, some of them have been cut up, both in cross sections and longitudinally, to ascertain the manner of their fabrication. They were found to be composed of bars surrounded by bands, like the staves and hoops of a cask, the whole welded together—those of larger size being formed on a *mandrel*, and the smaller ones forged solid and bored out. They were composed of successive series of these bars and hoops, laid on each other to make the requisite thickness of metal, and the junctions of these layers, as also of the bars and hoops of the same layer, were distinctly perceptible. The defects were enlargements and batterings of the bores, arising from the effects of the charges on the soft metal composing the guns.

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Bureau of Ordnance and Hydrography, April 2, 1844.

Sir,—In reply to your letter of the 28th ult., transmitting a call from the House of Representatives, for information respecting the strength, utility, and cost of wrought-iron cannon; and the result of the experience of European powers on the subject, which may be in the possession of this bureau,—I have the honor to submit the accompanying papers, marked from Nos. 1 to 4, viz:—

No. 1.—Capt. R. F. Stockton's report of his gun practice with his wrought-iron gun at Sandy Hook.

No. 2. Report of inspection of the first gun, by Commodore Wadsworth.

No. 3.—Capt. Stockton's report of proof of gun.

No. 4.—The cost of each of the wrought-iron guns, made under the superintendence of Captain Stockton, so far as paid for by this bureau.

Our information in relation to wrought-iron cannon is very scanty. Tousard tells us, in a note to page 190, volume first, Artillerist's Companion, that "in 1776 an iron gun was forged by Mr. Samuel Wheeler, an eminent artist, still living (1809) in the city of Philadelphia. It was intended, at first, as a four-pounder, but was only bored for a three-pounder. This gun was taken at the battle of Brandywine, and is said to be now in the Tower of London." I believe this is the only gun of which we have any record in this country, as having been used in actual warfare, and, as it appears, with success. The next account of the manufacture and proof of wrought-iron guns in this country, is found in the report of a board of officers of the army, as follows:—

"A six-pounder wrought-iron gun, manufactured by R. & S. Hunt

anchor makers, was tried at Watervliet arsenal, in 1832. This gun was fired two proof charges, and forty rounds service charges. At the eighteenth fire the band which held the trunnions slipped off, and had to be replaced. After the forty rounds, the gun still remained serviceable. The greatest enlargement of the bore was found to be 0.04 inch—which is more than double that of any of the brass guns proved lately; from whence we may infer, that if all difficulties were overcome, and a complete iron gun made, it would have no great advantage over bronze, as regards its durability. It is understood that these same manufacturers failed in making other wrought-iron guns.

"Although a proof gun can be made when the metal is selected with great care, and the fabrication carefully watched, yet, in fabricating them on a large scale, it will be impossible to take the precautions necessary to insure the perfectness of all these numerous welds. The smallest crack would contain moisture, which would produce oxidation; and this would, in time, destroy the gun. The board do not think it necessary to incur further expense in testing this material."

Again, says this report,—"Guns of this material (wrought-iron,) were the first used, and they have been tried at various periods since the first invention of gunpowder, and always without success.

"The first and greatest objection is the difficulty of welding the parts together perfectly, and the still greater difficulty of determining whether the welds are perfect, or not. In the account of a wrought-iron gun, tried at Toulon, in 1745, it is stated, that after the gun was broken up, the cascabel and trunnions were found to be held only by a portion of the faces which touched. Three-fourths of these faces showed the effects of rust."

It appears from most authorities that the art of casting guns was esteemed a great improvement upon the more ancient art of forging them, and, whatever may have been the cause, immediately superseded the latter. The cause may have been the vastly diminished cost of the cast-iron guns, or the facility of manufacture, or the opinion of greater security and certainty in the use; or, probably, the combination of all of these. Certain it is that the forged guns went entirely out of use.

Several accounts of these forged iron guns are given by writers on artillery. Tousard says, page 168, vol. i,—"There are at present (1809) on the ramparts of Narbonne, two old pieces, composed of iron bars, applied lengthwise, and encircled with strong iron hoops transversely, the whole soldered together. They are not much altered, although they have been neglected for a long time; but the rust has injured them most in the points of junction, and made these more apparent. It is probable that if, at the time when they were made, the arts had been as far advanced as they are at present, they would still be fit for service."

"New attempts have lately been made in France, at Guerigny, department de la Nievre, and in Spain, at Caveda, New Castile, to construct such guns, and they have been crowned with success. But

at first, when compared with cast-iron guns, wrought-iron heavy ordnance would have been attended with considerable expense, as well from the price of metal as from the attention which their fabrication requires; and secondly, the enormous consumption and want of cannon at that time (1794) compelled a recurrence to the most expeditious and least expensive proceedings—therefore, to confine their fabrication to cast-iron. However, they are not half as expensive as brass guns."

It may be remarked here, that Tousard was strongly in favor of experimenting upon wrought-iron cannon, with a view to their introduction into the service of the country. He observes, however, of cast-iron, "that if it was by some means possible to produce a more perfect melting of the iron, cannon cast of this metal, with an equal thickness, would be stronger, more durable, and lighter than brass cannon," page 198. He gives the preference, however, to brass cannon, because "the service of which should present more security."

Grose, in his Military Antiquities, vol. i, page 381, says that cannon "were, in general, constructed of iron bars soldered, or welded, together, and strengthened with iron hoops; others were made of plates of iron rolled up, and fortified with iron hoops." He speaks of several "at Woolwich—one belonging to ——— Pooley, Esq., in Suffolk," and "also several of those hooped guns in the Isle of Man, England." Bombards were at first chiefly made of hammered iron; but, in process of time, many were cast of that composition named bell, or gun, metal. They were also sometimes made of plates of iron and copper, with lead run between them. One of these guns was taken up on the coast of Ireland.

That wrought-iron guns, constructed of iron bars hooped together were used very generally, we know from the specimens yet preserved and the facts of history. James the Second, of Scotland, lost his life before Roxburgh castle, by the bursting of one of these guns. In 1545, a man-of-war, named the "Mary Rose," commanded by Sir George Carew, sunk off the Isle of Wight, with her whole crew. Three hundred years nearly after the accident, Mr. Dean, with his diving apparatus, raised a twenty-four pounder brass gun, and, at the same time, some iron guns. The iron guns were formed of iron bars hooped together with iron rings; and they were all loaded, &c.—*Wilkinson's Engines of War.*

"In 1813, a company of mechanics of Lyons, named the 'Etienne Company,' proposed to the French government to manufacture all the guns wanted of forged iron. They sent to Paris a specimen eight pounder, weighing five hundred and seventy pounds. It was mounted upon a truck carriage, with solid wheels, seventeen inches in diameter, and fired with three pounds of powder. The recoil was twenty-five feet; with four pounds of powder it was thirty-seven feet. The gun sustained nine rounds without injury; but the material was not approved by the French officers. Other pieces of the calibre of sixteen and twenty-four were made; the mode of fabrication seemed to be this:—Upon a tube formed after the manner of a common fowling piece, or gun barrel, bands of iron were welded, embracing the tube,

but in a direction contrary to that of the fibres of the tube, until the requisite size and strength were obtained. The gun was bored out to the proper calibre, and the breech piece screwed in and soldered to its place by silver solder, which was esteemed the best. The different bands of iron were welded to each other, and to the tube, by blows from the hand hammer.

"The inventor proposed to employ in the fabrication of twenty-four pounders, &c., bars of iron twelve feet long by one foot eight inches, which, forged out into skelps, and converted into bands thinned off at the sides, were welded together over a mandrel, under blows of a trip-hammer. The trunnions were welded to one of these bands. The bars used were twisted, and they believed that, as the small arms manufactured were excellent, this process augmented the tenacity of the metal by a fourth; and this was their secret.

"But extending the manufacture on a great scale, could we hope that the metal shall always be scrupulously chosen, and that a practiced and observing eye shall always watch over the degree of heat which the metal ought to have, in order to work to a uniform solidity the prodigious quantity of welding necessary to perfect the piece? When the gun is fired, the imperfect weldings will open imperceptibly, and the damps will penetrate the fissures, which, after a time, will cause the gun to crack, and form within the bore leafy exfoliations, which, retaining the fire, will occasion accidents. In short, the irremediable oxidation of the bore in time of war will so enlarge it, as to throw the piece out of service; and in time of peace they would require frequent painting to prevent this oxidation."

"The objections to the wrought-iron gun are continued thus:—

"1st. They promptly destroy the carriages by the suddenness and extent of the recoil.

"2nd. They incommode greatly the troops, by the length of the recoil.

"3rd. They will change their range greatly, by the continued and inevitable oxidation of the bore.

"4th. They enfeeble the moral of the cannonier, by the continued apprehension of their bursting.

"In fact, these guns often burst, although the first pieces furnished by the company for proof did not always burst. We have thus dealt at large upon the defects of wrought-iron guns, in order to reply, once for all, to the pretensions of an invention which claims to be good, and is often represented as new."—*Aide Mémoire*, vol. ii, page 784, &c. Paris, 1819.

Some of the Spanish writers speak of wrought-iron guns: thus, Ciscar, in his Tratado de Artilleria, Madrid, 1829, says,—"We do not owe the information that wrought-iron cannon of all descriptions formerly existed, to the Chevalier d'Arcy alone, but also to many writers. Texier de Norbec, amongst others, treats at length of various guns of this kind. From 1666 to 1694, there was one in the arsenal of Zurich, in Switzerland, of twenty-four pound calibre, the constituent parts of which admitted of being dismounted and replaced at pleasure."

"In the arsenal of Paris are found two pieces—one a twelve, and one an eight pounder—constructed of tubes one within the other, secured by strong bands, and the whole welded together; and I am assured that we have in our own establishments two wrought-iron guns, light, and of perfect workmanship."

"At the chateau of St. Dizier, a very old piece was found, of a calibre of twenty inches, and weighing seven thousand six hundred and sixteen pounds; the chase was made of wrought-iron, and the chamber and breech cast of the same metal. At Hartz, also, were some pieces, twelve and sixteen pounders, of wrought-iron, which do not appear to have been fabricated in the usual manner with bars and bands welded together, nor is the process known; they weigh about eight thousand pounds."

Again,—"At Brest is a cannon taken from the English, weighing seven thousand seven hundred and twenty-three pounds, eleven feet one inch long, and of six inch calibre. The bore is made of seven bars of wrought-iron, secured by bands of the same metal."—*Aide Mémoire*, vol. ii, page 784.

It appears that wrought-iron guns have been made from the earliest times, and were, until superseded by the introduction of cast-iron and bronze cannon, the principal artillery in use; that at different periods since the general use of cast guns, efforts to construct serviceable cannon of wrought-iron have been made by the principal European powers, and that, whatever may have been the cause, they have not been again employed in active warfare. The inference is, therefore, although no further information than the foregoing is in the possession of this bureau, that they have not been used for good and sufficient reasons.

The two wrought-iron guns on board the steamer "Princeton," being the only guns of that description ever used in the navy, no opportunity has been afforded this bureau of ascertaining the relative strength and utility of wrought and cast-iron cannon.

All of which is respectfully submitted.

I have the honor to be, very respectfully, sir, your obd't. serv't.

W. M. Crane.

Hon. John Y. Mason, Secretary of the Navy.

The Dipleidoscope.

Mr. Dent, the eminent chronometer maker of the Strand, had long felt persuaded that the interests of Horology would be greatly promoted, if the public could obtain a cheap, simple, and correct transit instrument, requiring little or no scientific knowledge for its right use, and not readily susceptible of injury, or derangement. To this end he devoted much time and thought; and, in 1840, he considered that he had succeeded in inventing an apparatus, which, by means of *shadows*, would produce the desired result. This idea he communicated to Mr. Bloxam, who thereupon informed him that his own attention had been for some years devoted to the same object, and

that he had contrived an optical arrangement, which, by the agency of a single and double reflection, determined the sun's passage over the meridian with great exactness. When the optical instrument, although complicate in its then form, was shown to Mr. Dent, he was immediately struck with the superiority of the contrivance over that which had suggested itself to ***him;*** his own method afforded three observations, but it was attended with the defects and inconvenience which result from the uncertainty of shadows. Convinced that the reflecting planes would effectually accomplish the desired end, he entered into an arrangement with Mr. Bloxam to undertake their manufacture; and, after nearly two years' attention on the part of that gentleman, and at great labor and expense on the part of the proposer, the instrument which we are about to describe was perfected, and may now be had at the trifling expense of two guineas.

The instrument possesses great advantages over any other of similar correctness; being exceedingly simple, it is not liable to get out of adjustment, or repair, nor does it require any attention beyond that which is, of course, necessary in the first instance, viz., that it be placed on a level surface, and in the meridian. The observations to be taken afterwards, can be made by any one, although previously unacquainted either with astronomical apparatus, or practical astronomy; the instrument being as simple as a sun-dial, while it is infinitely more correct, since it gives the time to within a fraction of a second.

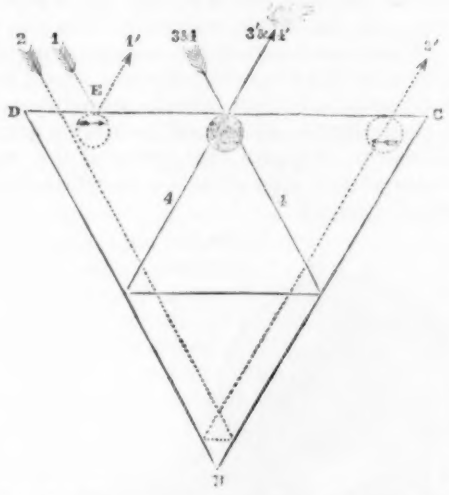
By the aid of this new patent meridian instrument, which is called the Dipleidoscope, any person may obtain correct time with the greatest facility, by an observation either of the transit of the sun over the meridian by day, or of the transit of the stars by night. In the following explanation, however, it is intended, for the sake of consulting both brevity and simplicity, to confine the directions to solar observation.

In the language of philosophy, the law which governs the transmission of light is, that the angle of the rays of incidence is equal to the angle of the rays of reflection. In other words, supposing the rays of light proceeding from an object to fall upon a reflecting plane, the eye of the observer must, in order to see the reflected image, be placed at precisely the same angle with regard to the plane, as the rays proceeding from the object to the plane. The rays falling upon the plane from the object are styled "the rays of incidence" as the rays again proceeding from the plane to the eye are termed the "rays of reflection." Keeping this law, or principle, in view, let us next consider the construction of the reflecting planes of the instrument in question.

There are three reflecting planes, D C, D B, and B C, fig. 1. Suppose D C, to be so divided that the ray No. 1, falling on D C, at E, will be reflected to the eye at 1', and the image of the sun will appear to advance in the direction from D to C. The ray No. 2, passing through D C, is reflected from C B, impinges on D B, and reaches the eye in the direction 2'. The image of the sun, thus formed, will appear to move from C towards D, because it has been *twice* reflected,

and thus the two images will *approach* each other. Suppose the ray No. 1, to have advanced to the position No. 3, and the ray No. 2, to the position No. 4, it will then be evident that their reflected rays will be in the same direction 3′ and 4′, and, therefore, that the two images of the sun coincide, as shown by the arrows being in the position of crossing each other, and indicating the instant of apparent noon; as the rays continue to advance, the images, having passed over each other, will, of course, be seen to separate.

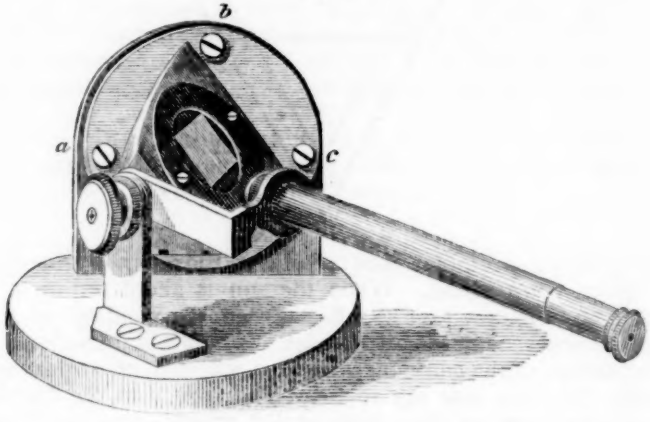
Fig. 1.



The following familiar illustration is introduced to further explain the optical construction. When the sun is about setting it is not uncommon to see the rays so reflected from the windows of a whole range of houses, as to convey the idea of a public illumination. While some portions of the sun's rays are thus reflected, other portions pass through the glass into the rooms. The rays thus transmitted (the rays of *incidence*, as they were styled above,) may be thrown at pleasure in any direction consistent with the range of the sun, by a person within the room, having a looking-glass in his hand: exactly as children produce what they call a *Jack o' lantern*. Now if, instead of throwing the rays upon a non-reflecting object (such as the wall, &c.,) he were to transfer them to another looking-glass, they would be again reflected from this latter glass. Supposing these two looking-glasses to be placed at an angle of less than 90°, in a manner corresponding with the position of the two silvered planes seen in the instrument, and also shown in the diagram at D B, B C, he can reflect the sun's rays again out of the window. Now, if we imagine the window to represent the outer reflector of the meridian instrument, its construction is, by this process, completely exemplified. To proceed a little further, it is evident, that the angle and situation of the two looking-glasses could be so arranged as to direct the rays of the

sun through any particular pane of the window; so that a person standing without, in a proper position, would see, in addition to the sun's rays reflected from the *outer* surface of the pane, the rays of incidence that had passed through the window, and were thus reflected from the double mirror. One of the luminous objects (the flash, or glare, of the sun,) so produced, would be reflected from the surface of the window, and would be a *single* reflection; while the rays of incidence, which had passed through the window, and undergone a *double* reflection by means of the *two* mirrors, would, on being thrown back by the mirrors through the window, move in a direction contrary to that taken by the single reflection from the surface of the window pane. Hence, any one of the heavenly bodies, subjected to the eye by a process of the above description, would not only appear as two distinct objects, but those objects would be seen to approximate and cross each other in an *opposite* course; a desideratum being hereby secured which increases the power of the instrument in a double ratio, and renders it proportionally perferable to any other that has been hitherto employed.

Fig. 2.



The wood-cut figure 2, represents a Dipleidoscope fitted up with a telescope, and having all the usual meridian and vertical adjustments, to be effected by means of the screws *a b c*. This form of mounting the instrument is suited to the observatory, or library, where it should be placed on a pedestal of stone, or cast-iron.

Civ. Eng. & Arch. Journ.

Robson's Patent Signal Lights.

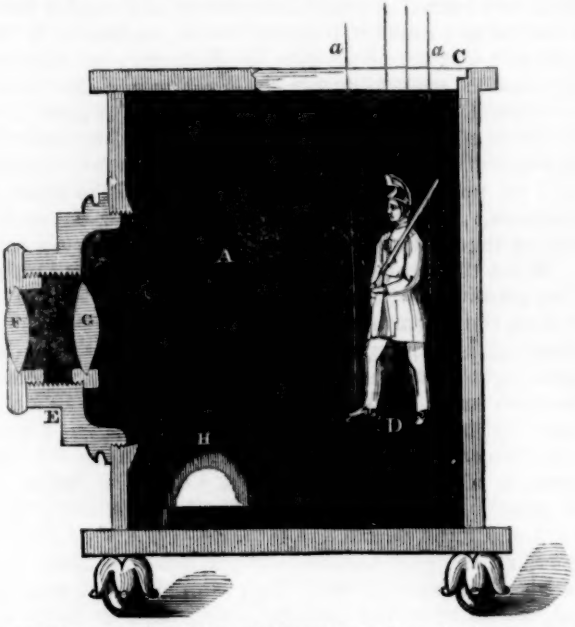
A number of gentlemen connected with shipping, railway, &c., and several connected with the scientific improvements of the age, who had been present at the distribution of prizes at the Society of Arts in the morning, attended at Blackwall in the evening of Monday last,

to witness some experiments with these lights, as signals, which gave the most entire satisfaction as to their superiority over the simple blue lights hitherto used in the navy, or any description yet introduced. They are of three colors, red, blue, and green, the composition being chemically prepared, so as to retain their properties after any lapse of time, and in any climate. For vessels at sea, and steamboats in crowded rivers, this invention has achieved a desideratum long required, viz., the obtaining a vivid and intense light *instantaneously*, and lasting from three to five minutes, with as much ease as pulling the trigger of a pistol, or lighting a lucifer match. The whole apparatus is about five inches in length, consisting of a *papier maché* case, joined at bottom to a small cylinder of wood, in which is inserted a screw of about a quarter of an inch in diameter; on the top of the case is the chamber containing the chemical compound, and through its centre is placed a quick match; a tiny globule of glass, containing sulphuric acid, is placed in the wood cylinder, and beneath it a small cake, composed of oxymuriate of potash and sugar, (our chemical readers will be perfectly aware of the result of the union of these three substances,) a tin slide passing through a saw-cut in the wood, and separating them—thus rendering accidental ignition next to impossible. When the light is required, the tin slide is withdrawn, and a turn of the screw then breaks the globule, the sulphuric acid comes in contact with the oxymuriate of potash, flame is evolved, and, by the communication of the match to the compound in the chamber, the most brilliant light is instantaneously produced. An ingenious suggestion has been made by Mr. Whishaw, viz., the practical application of these lights to a universal system of *numeral* signals. He proposes the following motions:—For figure 1, move the white light up and down in a vertical direction; 2, move the white light in a horizontal direction; 3, the same light in a semi-circle; 4, red light vertically; 5, red light horizontally; 6, red light semi-circularly; 7, green vertically; 8, green horizontally; 9, green semi-circularly; 10, either light in a complete circle. This simple lesson, once generally understood, would be of the greatest advantage to ships at sea—a mode of communication of incalculable benefit in cases of fire in the metropolis and large town, between the members of the fire brigades, as well as for telegraphic purposes generally. The intensity of the light produced may be understood from the report of Mr. G. Atkin, experimental chemist, on one of the smallest lights, three inches long, and three-eighths of an inch in diameter, in which he states that by Wheatstone's photometre it was equal to eighteen of the best sixteen hole Agand gas burners now used. The invention has been adopted by the Lords of the Admiralty, the Post Office authorities, &c.; and, from the facility with which the light can be produced, the entire absence from all danger, and the economy in their use, they will, without a doubt, become an indispensable adjunct, under all circumstances where signal lights are required.

Lond. Min. Journ.

Description of the Spectroscope, a new instrument for exhibiting supernatural appearances, etc. *By* T. W. NAYLOR.

The annexed drawing represents the internal structure of an instrument, devised by me, for producing such supernatural appearances as skeletons, wraiths, &c., on the semi-transparent parts of a dramatic scene, as, for instance, on the "sky" of a landscape, the window of a hall, or chamber, or the "impenetrable gloom" portion, in the centre of some haunted cavern, or witches' cave.



A, is a square wooden box of about two feet six inches each way; it has an opening C, to which can be fitted the perforated lid; the holes in the latter are to allow the strings *a*, *a*, *a*, that work the automaton D, to pass through from thence to a wooden cross held in the hand of the exhibitor. E, is a brass piece, to which two convex lenses F and G, are screwed; the compound focus of which ought to be about two feet. H, is an iron tray, on which an ounce, or thereabouts, of the chemical mixture called "*Bengal fire,*" is placed, a similar arrangement being made on the opposite side of the box.

When it is desired to put the instrument into action, it is drawn to such a distance from and behind the scene, that the image of the figure D, may fall thereon, and be shown distinctly; the stage is then darkened, either progressively, or suddenly, and the moment the Bengal lights are lit, the apparition will become visible to the spectators, producing quite a novel and peculiar effect, as the image has altogether a different aspect from any of those produced by magic lanterns,

or phantasmagoras; all of the latter having the appearance of mere superficial painted pictures, or transparent paintings, while the spectroscope one resembles, in every point, a solid object, the projections, indentions, and shadows of the limbs, drapery, &c., being strictly those observed in nature, which gives it a very mysterious reality under the circumstances in which it is seen. The effect may be still further heightened by applying to the instrument the principle of the phantasmagoria; that is, the power of apparently projecting the images among the spectators. The emergence of a skeleton forms an admirable subject, and by fantastically moving its bones during the period of its dilatation, the effect is terrific in the extreme.

All the figures ought to be painted with white lead mixed with very thin size, in order that as much light may be reflected therefrom as possible; and the inside of the box should be covered with black velvet to prevent any false glare.

The Bengal fire mentioned above, is composed of purified nitre, eight ounces; brimstone three and a half ounces, red sulphuret of arsenic two ounces, all ground together in a mortar to a very fine powder, and afterwards put into a bottle, to preserve it from the air and moisture.

Lond. Mechanics' Mag.

Description of a Self-Registering Pendulum for indicating the inclination of Ships under sail, etc. By A. G. Fyde, *Lieutenant Royal Navy.*

The very rudely constructed instruments placed on board ships to ascertain the degrees of inclination under canvas, or from lurching in a sea way, caused me to give my attention to the subject, as far back as the year 1836, and I had an instrument constructed, on improved principles, with self-registering hands, so that the maximum inclination could at any time be known. This, in a dark night with heavy squalls where the attention of the officer of the watch is required to shorten sail, could not be obtained; but the self-registering pendulum may be referred to after all is made snug aloft, and the maximum degree of inclination may be obtained.

Several of these instruments have been made from time to time, and supplied to her majesty's ships, on the application of their captains for them; the general reports of their usefulness have been acknowledged.

Subsequently to this I have made still further improvements by adding a register to mark the number of oscillations a ship would make in a sea way; taking a starboard and port lurch to constitute a roll.

The advantages which suggest themselves in making these additions to the pendulum are as follows:—

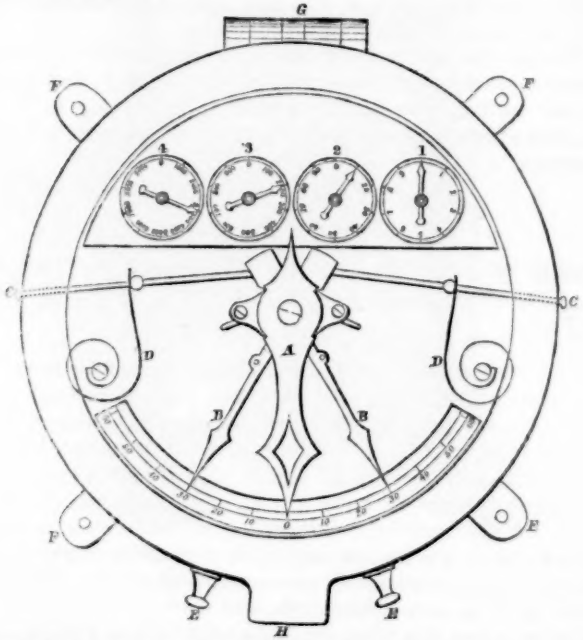
An accurate account of the stability of a ship, connected with the number of rolls made in a given space of time.

I apprehend if these instruments were supplied to an experimental

squadron of ships, their relative qualities could be much better obtained; at present we say one ship rolls more quickly than another, but our comparison may, in many cases, prove erroneous; but with the self-registering pendulum these requisites are actually pointed out, and relieve us at once of all doubts.

I would, therefore, submit that columns should be introduced in a ship's log book for registering the inclination and number of rolls made in every hour, or at any other convenient interval.

The accompanying sketch of the dial of the proposed pendulum will give some idea of it, but to draw plans and elevations of the machinery, at the back, sufficient to elucidate its construction would be occupying too much of your space; on which I fear I have already drawn rather largely.



A, the oscillating hand; B B, self-registering hands, moved by a pin at the back of A; C C, spring rods for resetting self-registering hand at zero; D D, springs attached to rods C C; E E, short bolts for securing the balance at the back, when the instrument is to be removed, or not required for use; F F F F, lugs for securing the pendulum to the wheel stanchion, or any other convenient place amidships; 1, 2, 3, 4, dials decimally divided, on which the number of rolls are registered; No. 1, having made one revolution, No. 2, marks one division, and so on with Nos. 3 and 4.

The figures represented by the dials are as follows:—beginning with No. 1, 10, 100, 1000, and 10,000. In reading off, therefore, if the number of rolls exceed 1000, we shall commence with No. 4, for

example, 3210, No. 4, will show on its dial 3000, No. 3, 200, No. 2, 10, and No. 1, at zero.

The whole is protected by a glass cover, G being the hinge, and H the lock.

Should you consider the foregoing description likely to prove interesting to any of your numerous readers, you will oblige me by giving insertion to it in one of your future numbers.

Lond. Naut. Mag.

Bessemer's *Patent Gold Paint.*

Since the appearance of this highly ingenious gentleman's specification, the writer has taken some little pains to hunt out whatever literary information is to be had upon the subject of *bronzes*, and has been surprised to find that little, or nothing, is to be found in books upon the subject. The writer has analyzed a specimen of rich copper colored bronze powder said to be of French manufacture, and he finds it is merely composed of copper and zinc, alloyed and colored by cinnabar in a state of extremely fine division. Some vegetable coloring material (lake, probably,) is also present. This bronze powder, therefore, seems to be only Dutch gold powdered and colored.

Before Bessemer's specification had been published, the writer had also analyzed his preparation, and found it to consist of

Copper, ...	77.50
Zinc, , ...	21.91
Lead, ...	0.19
Tin, ...	Traces.
Iron, ...	0.21
	99.81
Loss, . .	0.19
	100.

The amount of iron present, which then surprised him, is now seen obviously enough to be derived from this mode of grinding the metals on steel surfaces.

The probable working proportion of the alloy is most likely 70 copper, and 30 zinc, the difference being volatilized (of the latter) in the fusion. The nearest atomic alloy to this is that (3 Cu + Zn) of 3 atoms of copper, and 1 of zinc, which is, by weight, 74.58 copper, and 25.42 zinc. This is the alloy of common rolled sheet brass.

In the proceedings of the Royal Irish Academy, for last year, will be found a paper by Mr. R. Mallet, of Dublin, describing the proportions of brass found in a very unusual state of aggregation, viz., ground under the brass bearing of a heavy shaft into an impalpable powder, precisely similar to Bessemer's, and afterwards aggregated, and become perfectly hard, coherent, and capable of being filed with metallic lustre, *but having a jet black fracture;* the aggregation

having been produced merely by great pressure, and at, or a little above, the temperature of the atmosphere.

In fact, there are few persons who must not have remarked the extreme state of division in which the metal of shafts, bearings, and wheels are occasionally abraded in contact with oil. The writer possesses cast-iron, thus levigated, from a pair of mitre wheels, as fine, unctuous, and soft, as black lead; and where power is cheap, it seems possible that a substitute for plumbago might thus be formed from cast-iron, of the softer and more carbonaceous sorts, to advantage. The Styrian irons, and Scotch ones, which are so soft, and rich in carbon, would answer best.

Bessemer's gold paint, owing to its extreme state of division, possesses also some remarkable physical properties. Thus, it is *apparently* perfectly infusible by the blow-pipe, or charcoal; the fact being that, while really in fusion, its minute particles have not sufficient mutual attraction to cause them to cohere, and form a fluid globule. They will not even cohere with the aid of a flux, such as borax; but if the red hot mass, which has been thus caused just to stick together, be suddenly dropped into a steel mortar, and struck while hot, (in the same way as Doctor Wollaston caused his platina powder to weld together,) it coheres, and now breaks with a distinct brassy fracture; and, on reheating, at once fuses into a fluid globule of brass.

There is no doubt but that, by severe pressure, and a gentle heat, this fine powder could be caused to aggregate and weld together like the metal described by Mr. R. Mallet, and thus afford proof that the *welding* property is not an exclusive one attached to iron, and doubtfully to platina; but that it belongs to all bodies that pass through an intermediate state of softness, of pastiness, between the solid and the fused conditions, and that its only essential other conditions, are pressure, and the mutual presentation of the particles to each other free from oxidation. This latter obtains in iron; though so oxidable a metal, in virtue of the great affinity of its oxides for silica, with which they form a fusible coating that protects the iron; and jet squeezes out from between the surfaces presented at the scarph.

But to return. The merit of Mr. Bessemer's patent gold alone can consist in the cheapness with which he can afford it; for as to the mode of using it in a fluid paint, the same may be done with any common bronze powder; but the fatal objection to the extended use of this material, either for in-door, or exposed, work, is that which equally affects the bronze powder, viz., that both are liable to the most complete and rapid deterioration of color, or even total destruction of appearance, by the reaction of those foreign bodies which the air of cities and lighted, or crowded, buildings contain in abundance. Thus, the writer finds Bessemer's gold is discolored instantly by sulphuretted hydrogen, or by ammonia, and rapidly by these bodies existing in common coal gas.

No external varnish seems to be capable of arresting the progress of these changes, which depend upon chemical affinities of great force, and in constant action.

The varnish sold with the gold paint appears to be nothing more

than fine spirit of turpentine mixed with a little varnish, or gold size. Turpentine varnish, diluted with spirit of turpentine, appears to do just as well.

R. M.

Lond. Mechanics' Mag.

New Safety Lamp.

At the last meeting of the Literary and Philosophical Society, Newcastle, Mr. Henry Smith, of that town, described a lamp invented by him, or, as it may rather be called, an improvement on Stevenson's lamp, still in part adhering to the principles of the Davy. By a careful consideration of the subject, Mr. Smith has come to the conclusion that more air is admitted in the Davy than is necessary to support combustion. Stephenson's lamp admits but a small quantity of air, and is thus easily put out by a change of position, or a current of air, and when the atmospheric air is deteriorated by the mixture of hydrogen, sufficient oxygen is not admitted, and the light is extinguished; it, therefore, shows when the air is impure, but so sensitively, that it is extinguished before any accident can occur. Mr. Smith's lamp resembles the Davy in the brass reservoir and top, and the same kind of wire gauze, but, in addition, at the bottom of the wire gauze, there is a hollow metal beading, which constitutes an air chamber, opening into which, from the outside, is a series of holes, so apportioned that the flame cannot go out until the air becomes too vitiated for a man to breathe in it; inside the wire gauze is a glass cylinder, with a copper top, perforated with holes; the gauze fits close to the copper top, and is held fast by a screw, which also carries the glass. In this lamp it will be seen that the flame could not ignite the inflammable gas outside, without passing in a downward direction through the gauze first, then the air chamber, and lastly, through the perforated head. The miner cannot light his pipe at the flame, the danger of ignition from particles of fine coal dust is avoided, and, should the glass be broken, the lamp is still a Davy lamp.

Ibid.

Easter Day, 1845. *By* A. De Morgan.

[The grave mistake which forms the subject of the following notice by Professor De Morgan, in the *Athenæum* of Saturday last, cannot be made too extensively, or too speedily, known.]

In an article which I have prepared for the next number of the "Companion to the Almanac," I have discussed the reasons why Easter Day will next year fall, in apparent defiance of the act of Parliament, upon the very day of the full moon. But as an accidental application which I have received (and I know that the superintendent of the Nautical Almanac has received another from a different quarter,) makes me think that the computers of almanacs will be puzzled, and that the useless discussion of 1818, (when the discrepency last occurred,) will be revived, unless some one will forthwith state

the reason of the difficulty, I request that you will publish some of the conclusions of the paper to which I refer, which will in due time appear in the work cited. The rule adopted in this country for finding Easter, is that of the Roman Catholic Church, as established at what is called the reformation of the Calender by Pope Gregory XIII. in 1582. The authority for this rule is contained in the papal brief of March 1st, 1582, in which reference is made, for all explanations, to the then forthcoming work of the Jesuit Clavius, to whom both the adjustment and explanation of the calender had been intrusted. The British Parliament, in adopting the *rule* of Clavius, made two mistakes in the *explanation* of that rule. Their explanation is, that Easter Sunday is the Sunday after the full moon, which comes on, or next after, the 21st of March, and that if the full moon fall on a Sunday, Easter Sunday is the next Sunday.

The two mistakes are as follows:—

1. Instead of "full moon," they should have said "fourteenth day of the moon, the day of new moon being reckoned as the first."—That Easter, as well as the Passover, was always regulated, not by the full moon, but by the fourteenth day of the moon, is of the utmost historical notoriety. And Clavius says, that "none but a few who fancy themselves sharp sighted, ever imagined that the fourteenth of the moon and the full moon were the same in the Church of God."

2. Instead of the "moon" of the heavens, they ought to have said the "moon of the calendar," which is a very different thing. The moon of the calendar is not even a mean, or uniformly moving moon, to which astronomers refer the real moon, but differs from it intentionally and avowedly, by two classes of arbitrary alterations, the first class intended for simplicity of calculation, the second for avoiding the possibility of the Christian Easter falling on the actual day of the Jewish Passover.

In the year 1845, the fourteenth day of the *calendar moon* falls on Saturday the 22d of March, whence Easter is rightly made to be Sunday the 23d, according to the law both of the Roman and English churches, though the English statute does not well explain its own method. With regard to this country, it should be noticed that this statute enacts that Easter shall be kept by the "calendar, tables, and rules," annexed to the act; and these agree with Clavius.

Of course any one is at liberty, as many did in 1818, to think that the statute should be altered; and certainly, it would be worth while to avoid misconception by repealing the faulty definition, and substituting a better one, in the prayer books of the Established Church. But if any one should wish to advocate the repeal of the rules, and the construction of new ones agreeable to the existing definition, and astronomically true, he will perhaps pause when he finds that his own system would *sometimes* cause it to happen that St. Paul's Cathedral must keep Easter a week after Westminster Abbey, and would very frequently make a week's difference between the festivals of the colonies, and the mother country.

University College, London, June 14, 1844.

Ibid.

A simple method of Tracing upon the surface of a cylinder Spirals of any given constant, or variable, obliquity. *By* Mr. Robert Mallet.

For many purposes of the arts a simple and rapid method of tracing spirals upon a cylindric surface is important; carvers, wood turners, &c., often want such, and in larger works, such as some particular branches of mill work and engineering, it is also frequently wanted.

The usual method, by dividing the cylindric surface into equal portions in circumference and length, and drawing diagonally is tedious. The following method, believed to be new, is simple and ready, and sufficiently exact for most purposes. Two straight edges of equal length and width, and about five-eighths of an inch in thickness each, are to be secured on a table, parallel to each other, standing on their edges, and distant from each other by nearly the length of the cylinder upon which the spiral is to be marked. Between these there is to be also secured, in a diagonal direction, stretching from one to the other, a third straight edge, formed of two slips of deal glued together, with a slip of straight cut thick Bristol board between them, projecting one-eighth of an inch at one edge. The section will then be thus—

Fig. 1.

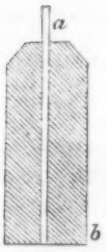
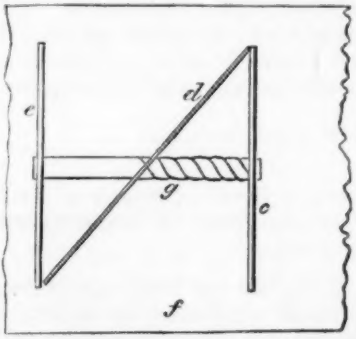


Fig. 2.



The entire height of this from *a* to *b*, when standing on the table, must be a *shade* more than that of the two other straight edges. The three pieces being then thus arranged, the edge of Bristol board is charged with printer's ink. Then, on causing the cylinder to roll over the edges of the two parallel straight edges, in the direction of their length, the diagonal slip of inked Bristol board will trace a spiral upon the surface of the cylinder with very considerable accuracy.

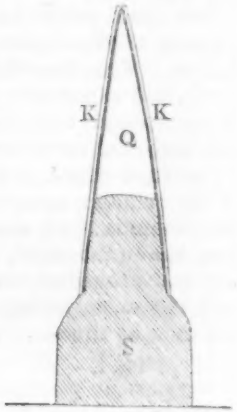
Fig. 2, *c c*, the parallel straight edges; *d*, the diagonal tracer; *f*, the table; *g*, the cylinder, partly traced. The obliquity of the tracer with respect to the straight edges, will be an angle equal to that which the spiral at any point is intended to make with the axis of the cylinder. Hence, if the obliquity of the spiral, or pitch of the screw,

is to be variable, the tracer, in place of being straight, must be a curved edge, the angle formed with the straight edges (or rolling bars, as we may call them,) varying as determined.

The length of the rolling bars will be equal to the circumference of the cylinder to be marked, as many times as the number of revolutions of the spiral.

Spirals may be marked on the surfaces of cones in this way, and the method is peculiarly applicable for marking on the large scale the trace spiral of screw propellers.

Fig. 3.



Polygonal prisms may also be so marked with spirals.

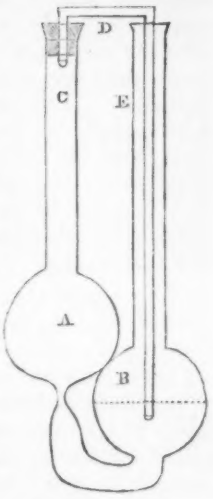
For marking upon metallic turned surfaces, the trace of large original screws, there must be substituted for the Bristol board tracer, one formed of two sheets of thin brass, meeting at an acute angle, and charged between with printing ink. While the upper edges of the rolling bars must be covered with a surface of buff leather, both to prevent slipping (for which end the metal surface and these should be chalked,) and to allow by compression of firm contact between the metallic cylinder and the inking tracing bar, which is like a sort of continuous drawing pen. In section thus: K K, plates of brass; Q, space for ink; S, wood base. I have found this simple arrangement useful on several occasions, and am anxious thus to make it more so.

Ibid.

Apparatus for the analysis of Carbonates by ascertaining the loss of weight from the disengagement of Carbonic Acid Gas. By Dr. Ure.

A few years ago I had the following apparatus made for the ready analysis of carbonates, by ascertaining the loss of weight they suffered from the disengagement of their carbonic acid gas, during their solution in an acid. A B, are two globes of about two inches in diameter each; A, has its inferior neck strangled into a bore nearly capillary; B, stands lower, with its centre line on a level with the narrow neck of B. The tubes of these globes are about one-half inch in diameter. C, is shut at top with a perforated cork, through which enters, air-tight, a small glass tube, which is bent across to the mouth of the tube E, and then passes down into it a little below the centre line of the globe B. This globe is rather more than half filled with sulphuric acid, when the instrument is employed in the analysis of the carbonates. The standard weight of carbonate of soda $=24\frac{1}{2}$ grains, or of carbonate of potash $=31\frac{1}{3}$ grains, is then put into A, having previously laid a minute globe, or glass, over the lower orifice;

the cork, with its small tube, is now firmly adjusted, and the apparatus is weighed in its upright position, either by suspension with a hook to the end of the beam, or by resting it on the scale in a light socket of any kind. It is next laid hold of, and inclined so as to cause a little of the acid in B to pass over into A. Effervescence ensues with greater, or less, vehemence, according to the nature of the carbonate, and quantity of the acid introduced. Should it be too violent, and threaten an overflow by intumescence, it can be instantly abated to any degree by the slightest slope of the instrument. Now, this power of control forms the peculiar feature and advantage of this contrivance; whereas, in all other forms of such apparatus that I know, whether by sucking over, or pouring in, if a little too much acid comes upon the carbonate, the experiment is effectually marred. The gas disengaged in A, must necessarily traverse the sulphuric acid in B, and be stripped of its moisture before escaping into the air. Having supersaturated the alkaline base, and cooled the apparatus, we weigh it again, and the loss of weight in grains and tenths denotes the per centage of soda, or potash, provided their neutral carbonates had been the subjects of experiment. For limestone, on the same plan of computation, 22¼ grains may be taken. It deserves to be noted, that the present instrument has only one junction, and needs no chloride of calcium, a substance so apt, by its swelling, to burst the glass tubes that contain it.*



Lond. Journ. Arts & Sciences.

Steam Communication with France.

The Princess Mary steamer, which has been built for the South Eastern Railway Company, by Messrs. Ditchburn and Mare, and fitted with Messrs. Maudslay and Field's annular cylinder engines, made her trial trip on Wednesday, June 18. She left Blackwall at forty-three minutes past 10 o'clock, and arrived off the east end of the Isle of Sheppy (a distance of fifty miles,) at seven minutes past 2, being at the rate of sixteen miles an hour, against the tide the whole way. Every thing that could be desired concurred to give her an opportunity of testing her power; the, till now, fastest steamer, the Prince of Wales, leaving Blackwall some minutes before her; the Isle of Thanet also preceded her by twenty minutes; they were, how-

* 1000 water grain measures of sulphuric acid of specific gravity 1.032, or 32 above water, neutralize 32 grains of soda, and, consequently, one atom, on the hydrogen scale, of each of the other bases, reckoned in grains.

Having, in the course of many years, subjected my tables of sulphuric, nitric, and muriatic acids, as well as of ammonia, to strict cross examination, I have found them trustworthy for all alkalimetrical and acidimetrical purposes.

ever, both passed in gallant style at the point above stated, the Princess Mary crossing their bows, making a circuit around them, and returning on her homeward voyage. The Princess Mary, on the Boulogne station, must have immense influence in determining the continental traffic to the south-eastern line. There can be no doubt, from the known energy and skill of the directors of the railway company, that this important branch of the service will be thoroughly well done. The influence of the railway is already telling well in this particular. Ostend has the Princess Alice, Dover the Magician, Folkestone the Princess Mary; and we shall be much surprised if the latter do not bear away the palm from its competitors. The Princess Maude, another iron steamer, built for and by the same parties, and of equal speed, is expected to be completed for the Folkestone station, in a few weeks.

London Times.

Bronze.

The Chinese bronze copper in a very superior manner. This is the mode of the ancients for urns and other little vases and ornamented goods. After having rubbed the article with the ashes of coal and vinegar in such a manner that the copper is very shining, they dry it in the sun, then they cover it entirely with the following composition: two mace of verdigris, two mace of mineral cinnabar, two mace of sal ammoniac, two mace of the beak and liver of duck, five mace of alum, well pounded, well mixed, and moistened sufficiently to make a paste, which may be spread. (The *mace* is the tenth part of a Chinese ounce.) When the article is thus prepared it is passed through the fire, and washed when it is cold. It is covered a second time with this composition; it is then passed through the fire, and it is washed thus ten times. The small pieces thus bronzed, are of great beauty, and lose nothing by being exposed to open air and rain. —*Capt. Pidding's Chinese "Olio."*

ENGLISH PATENTS.

Specification of a Patent granted to Henry Austin, *of the county of Middlesex, for a new method of Gluing, or Cementing, certain materials, for building and other purposes.*—[*Sealed 10th June,* 1843.]

The cement used by the patentee is made by mixing India rubber with cold naptha, in the proportion of eight ounces of India rubber, cut into small pieces, to each gallon of naptha, stirring it from time to time until the India rubber is dissolved; then, to one part, by weight, of this mixture, two parts of lac are added, and the whole is thoroughly blended together by the application of heat, accompanied with occasional stirring. When greater elasticity is required, a larger propor-

tion of the India rubber solution is used; if greater hardness is necessary, a larger proportion of lac is employed; and where the India rubber would be liable to injury from great exposure and pressure, a much less proportion is used, and it is sometimes dispensed with altogether; asphalte, pitch, or resin, or other materials of that nature, may, in some instances, be substituted for the lac.

The materials for building purposes to which this cement is applied, are slate, tiles, stone, glass and metal plates. When being used, the cement is kept in a heated state in a dish, or vessel, containing a narrow trough, termed a stamper, which slides up and down therein, between guides; the slate, or other material, is brought to a heat of 150 Fahr., and placed upon the dish, and the stamper, being then raised, imprints, or stamps, a margin of cement thereon. The requisite margins of cement for forming overlapping joints being thus applied to the slate, or other material, the cemented portions, or margins, are laid in contact with each other, and in a short time become firmly united, forming water-tight surfaces. Sometimes, to expedite the process, a coating of naptha, or other spirit that will act upon the cement, or a solution, made by dissolving the cement in naptha, or other spirit, is applied to the cemented portions, or margins. The cement may also be used for securing the above materials to the building, as well as to each other.

The patentee connects pieces of glass together with the above cement, when making sky-lights, conservatories, frames for horticultural purposes, &c.; he also cements slate, stone, metal, and manufactured clays, and cements together, or to wood, or to woven, or other fabrics, or woven or other fabrics to wood, for building and other purposes; he likewise cements pieces of leather together, for making boots and shoes, and hose, or pipes, for fire engines; also, leather and cork together, or to wood, metal, or woven, or other, fabrics, and woven, or other fabrics, to wood, for the manufacture of trunks, portmanteaus, packing-cases, and other purposes. When joining these materials, the parts must be dry, and free from dust, and should be warmed previous to receiving a coat of the cement, in order that it may not be chilled at the moment of application. If the joint is to be made at once, the parts must be expeditiously put together, and pressed, as the cement rapidly loses its heat, and becomes solidified; but the junction may be effected at any subsequent period, by the application of heat, or the spirit, or solution before described.

The patentee claims, firstly, the application of caoutchouc (India rubber,) in combination with other materials, for the purpose of gluing, or cementing, together slate, tiles, stone, and metal plates, for roofing and other building purposes; and glass, for such building and other operations, as above described; secondly, the use, or application, of the above described cement, glue, or composition, for the purpose of gluing, or cementing, together the materials above mentioned, for building and other purposes.—*Enrolled in the Enrolment Office, December*, 1843.

Lond. Journ. Arts & Sciences.

Specification of a Patent granted to CHARLES TOWNEND, *of Manchester, for an improved process, or manufacture, whereby Cotton Fabrics are aided and made repellent to water and mildew, and any unpleasant smell is prevented in such fabrics.—Sealed 6th March*, 1844.

This invention is intended to be applied chiefly to fustian cloths, called "beverteens," although it is also applicable to other cotton fabrics; it consists in rendering the fabrics repellent to water and mildew, and preventing any unpleasant smell, by steeping them in, or passing them through, the solutions hereafter described.

As the general practice of dyers is to mix their solutions, with reference to the weight of the cloth, or other material, to be immersed therein, and without regard to its length, or width, the patentee describes his process upon this plan; the quantities mentioned being calculated for fabrics, of which a piece, sixty yards long, and twenty-seven inches wide, will weigh forty pounds.

To prepare a solution in which the fabrics are to be immersed, the patentee proceeds in the following manner:—Twenty pounds of calcined British gum are mixed with eight gallons of cold water, in a suitable vessel, or vat, until fine and pasty; then ten pounds of palm, or white, soap are dissolved in eight gallons of boiling water, in another vessel, and this solution is added to the former, together with one pint of logwood liquor, and the whole is boiled up together; three pounds of rock alum, dissolved in one gallon of water, are then added, and the mixture, after boiling for a few minutes, is ready for use. The cloth, or fabric, (having been previously prepared and dyed in the ordinary way, is steeped in, or passed through, the above mixture, or solution, in the usual manner of stiffening and drying cotton fabrics.

Sometimes the patentee uses two solutions in succession, one of whichis formed by boiling six pounds of sulphate of zinc in nine gallons of water, and, when cold, drawing off the clear solution; the other is made by dissolving twenty pounds of calcined British gum in eight gallons of cold water, and ten pounds of palm, or white, soap in eight gallons of boiling water, then mixing these two solutions, and, after adding a quarter of an ounce of pearl ash, bringing them up to a boiling heat. The cloth, or fabric, is first steeped in, or passed through, the zinc solution, and is immediately afterwards steeped in, or passed through, the other solution.—*Enrolled in the Rolls Chapel Office, May*, 1844. Ibid.

Specification of a Patent granted to THOMAS MURREY GLADSTONE, *of Wolverhampton, for certain improvements in machines for Cutting, or Shearing, Iron and other Metals, which improvements are applicable to other like purposes.—Granted December* 28, 1843; *Enrolled June* 28, 1844.

This invention consists principally in the peculiar construction of

the shears, as will be seen by the accompanying drawings, and the following description; fig. 1, being an end view of a double cutting machine, and fig. 2, an elevation of one side thereof; *a*, is the foundation plate, and *b*, a standard cast upon it; *c* and *d*, are also two standards, dove-tailed into the foundation plate, and secured to the same by means of bolts; *e*, is the shear, the form of which will be seen in fig. 2, partly shown in dotted lines; this shear moves upon an axis *f*, which axis is supported by the standards *b* and *d*; *g*, is a projecting arm of the shear, to the end of which is attached one end of a connecting rod *h*, the opposite end being attached to some moving power; *i*, is a piece of metal attached to the shear, and forms part thereof; *k* and *l*, are two steel cutters, the former being fixed to the piece *i*, and the latter to the standard *c*.

Fig. 1.

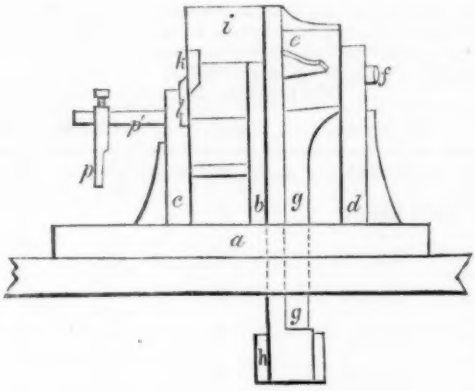
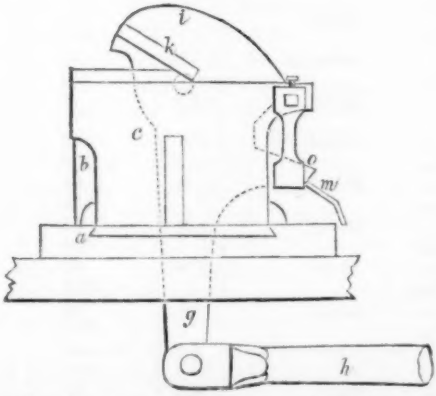


Fig. 2



In cutting, or shearing, a plate of iron, the plate is inserted at the front of the machine, and the strip of metal cut off, instead of curling up as usual, is kept down and straight by that part of the shear marked

i, coming upon it; and when the same is cut off it falls between the standards *c* and *b*, and upon an inclined plane *m*.

There is also another pair of steel cutters, one of which is attached to that part of the shear marked *o*, in figure 2, the other cutter being fixed to the inner face of the standard *b;* these cutters are intended to cut up the strips of metal into pieces of any desired length, which may be regulated by the sliding stop *p*, which is made to fit upon a bar *p'*, fixed to the side of the machine, the strips of metal to be cut up being inserted into the machine crossways. Civ. Eng. & Arc. Journ.

Lunar Occultations.

Lunar Occultations visible in Philadelphia, computed by Mrs. Charlotte S. Downes, from the Elements published with the Occultation list for the United States Almanac.

The Immersions and Emersions are for Philadelphia, mean astronomical time. Im. for Immersion, Em. for Emersion. These abbreviations in *Italics* refer to those Immersions and Emersions which take place on the Moon's dark limb. N. App. for Near Approach.

The angles are for *inverted image*, or as seen in an astronomical telescope, and reckoned from the Moon's North point and from its Vertex around through East, South, West, to North and Vertex again. For direct vision add 180°.

DECEMBER, 1844.

Day.	H'r.	Min.	Star's name.	Mag.	From North.	From Vertex.
2	10	11	Im. *u* Leonis,	6	127°	174°
	11	0	*Em.*		271	320
2	10	57	N.App.57 Leonis, ☽ N. 3′.	7		
14	5	24	*Im.* 44 Aquarii,	6.7	26	14
	6	7	Em.		271	259
14	7	28	*Im.* Bessel,	9	72	35
	8	36	Em.		232	187
14	9	31	*Im.* Bessel,	9	46	358
	9	51	Em.		263	214
14	9	51	*Im.* o Aquarii.	6	31	344
	10	40	Em.		280	229
15	5	36	*Im.* Bessel,	7	64	59
	6	58	Em.		232	207
15	8	30	*Im.* Bessel,	9	21	340
	9	23	Em.		284	238
15	8	30	*Im.* Lalande,	9	133	92
	9	5	Em.		172	129
15	8	54	*Im.* Bessel,	8.9	97	55
	9	50	Em.		211	164
16	5	8	*Im.* Bessel,	9	66	84
	6	32	Em.		229	221
16	7	32	*Im.* Bessel,	9	55	30
	8	52	Em.		247	266
16	9	17	*Im.* Bessel,	9	63	19
	10	28	Em.		248	199
16	9	23	*Im.* Bessel,	9	66	23
	10	35	Em.		244	195
16	12	20	*Im.* Bessel,	9	94	44
	13	11	Em.		229	180
20	4	40	*Im.* 54 Arietis,	6.7	42	87
	5	42	Em.		277	329
22	13	18	*Im.* *ι* Tauri,	4.5	87	36
	14	35	Em.		285	230
28	3	26	*Im.* ζ Tauri,	3.4	84	127
	4	19	Em.		266	315
23	17	47	Im. c Lextantis,	6	82	56
	18	48	*Em.*		339	301